U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 1

RECORD OF DECISION

SOUTHWEST PROPERTIES

WELLS G&H SUPERFUND SITE

OPERABLE UNIT 4

SEPTEMBER 2017

PART 1: THE DECLARATION

PART 2: THE DECISION SUMMARY

PART I - DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Wells G&H Superfund Site
Woburn, Massachusetts
CERCLIS ID # MAD980732168
Southwest Properties, Operable Unit 4 (OU4)

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Southwest Properties (SWP), Operable Unit 4 (OU4) of the Wells G&H Superfund Site (Site), in Woburn, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 USC §§ 9601 *et seq.*, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, as amended (NCP), 40 C.F.R. Part 300 *et seq*. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision (ROD).

During previous Remedial Investigation / Feasibility Study (RI/FS) activities, the SWP were considered a portion of the Central Area, which is Operable Unit 2 (OU2) of the Wells G&H Superfund Site. Under this ROD, the SWP cleanup has been separated from OU2 and is now designated as OU4.

This decision document was based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at the Woburn Public Library and at the United States Environmental Protection Agency (EPA) Region 1 OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix G to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Commonwealth of Massachusetts (the Commonwealth) concurs with the Selected Remedy (See Appendix A).

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. The November 2016 Remedial Investigation (RI) Report for the SWP summarizes the nature and extent of the contamination and was used to prepared a December 2016 Feasibility Study (FS) Report that identified all the remedial options considered for cleanup of the SWP. In addition, EPA prepared a July 2017 FS Report Addendum – Technical Memorandum which modifies sections of the FS and supports this ROD.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for the SWP (OU4 of the Wells G&H Superfund Site), which involves the excavation and off-site disposal of principal threat source material within the Northern Whitney Soil Area and Non-Aqueous Phase Liquid (NAPL) Areas and the excavation and off-site disposal of low-level threat contaminated wetland sediment/soil from the Murphy Wetland which exceed human health and/or ecological risk standards; restoration of the Murphy Wetland; the excavation and off-site disposal of soil to facilitate capping and maintain flood storage; and the capping of soil across the Murphy, Whitney and Aberjona Properties which exceed human health cleanup levels for direct contact and/or leaching of contaminants to groundwater. The selected remedy also includes extraction and treatment of contaminated groundwater containing volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), petroleum hydrocarbon fractions, pesticides, polychlorinated biphenyls (PCBs) and metals in overburden and bedrock aquifers and long-term monitoring to monitor the effectiveness of the treatment. To facilitate future use and redevelopment of the SWP consistent with the cleanup, the selected remedy also includes Institutional Controls which will preserve the remedy and ensure that impacted soil and groundwater encountered during future intrusive activities (e.g., installing subsurface utilities, building foundations/slabs, etc.) is appropriately managed to protect human health and the environment. Periodic Five Year Reviews are required to assess protectiveness.

The selected remedy is a comprehensive approach for the SWP that addresses all current and potential future risks caused by soil, groundwater, and wetland sediment/soil contamination, and results in no net flood storage loss. The remedial measures will remove principal threat source material from the SWP, remove low-level threat contaminated wetland sediment/soil from the Murphy Wetland and restore the wetland area, cap the low-level threat soils across the SWP to prevent exposure and the future leaching from the low-level threat soils into the groundwater in excess of drinking water standards; restore groundwater within the contaminant plume to a level protective of human health and the environment; and will allow for restoration of the SWP to beneficial uses. Institutional Controls will be used as part of the selected remedy to maintain the soil caps, prevent residential, school, and daycare uses of the properties, prevent exposure to contaminated groundwater until the cleanup standards are met and to require evaluation of the vapor intrusion pathway.

The major components of the selected remedy are:

1. Excavation and off-site disposal of approximately 5,400 cubic yards of significantly contaminated soil[1] at the designated Northern Whitney Soil Area, and blending remaining contaminated soil below the water table with an amendment (*e.g.*, Zero-Valent Iron (ZVI)) prior to backfilling to provide soil and localized groundwater treatment. In addition, excavation and off-site disposal of approximately 12,400 cubic yards of soil in the Murphy upland, Whitney, and Aberjona Property areas to facilitate installation of

1 "Significantly contaminated soil" defined as soil with contaminant concentrations 10 times greater than the soil cleanup levels and/or greater than or equal to 50 milligrams per kilogram (mg/kg - equivalent to ppm) of PCBs.

impermeable caps (for a total of approximately 18,000 cubic yards of excavated soil). Construction of impermeable caps over areas with lower concentration soils that exceed cleanup levels to reduce soil exposure risks and/or prevent contaminant movement to groundwater;

2. Excavation and off-site disposal of NAPL in the Murphy and Whitney Property areas, including approximately 6,000 cubic yards of NAPL-contaminated soil and the blending any remaining NAPL-contaminated soil below the water table with an amendment (e.g., ZVI) prior to backfilling to provide soil and localized groundwater treatment;
3. Containment and cleanup of groundwater contaminants throughout OU4 by pumping and treating the groundwater;
4. Excavation and off-site disposal of approximately 7,000 cubic yards of wetland sediment/soil from the Murphy Wetland exceeding cleanup levels and wetland restoration;
5. Long-term monitoring and periodic Five-Year Reviews;
6. Institutional Controls to maintain the integrity of the soil caps and other remedial components; to prevent development of the properties for residential, school, and daycare use (except on the Aberjona residential area); to prohibit use of contaminated groundwater until cleanup levels are met; and to require evaluation of the vapor intrusion pathway if a change in usage of any of the existing buildings is contemplated or as part of new building construction, including any addition/alteration to existing buildings on any of the properties.

A RI/FS of the OU2 Central Area was undertaken by several of the OU1 Settling Defendants (e.g. Beatrice Company (Beatrice), UniFirst Corporation and W.R. Grace & Co.) and submitted to EPA in February, 1994. A separate RI was also undertaken by Beatrice which specifically addressed the SWP (February, 1994). This separate RI for the SWP was supplemented with an August 2003 RI report by Beatrice. Following this work, EPA issued a Baseline Human Health Risk Assessment (BRA) for the SWP in March 2004, which was later updated in February 2006. This work necessitated a third phase of RI activities at the SWP in 2010 to 2013, including additional groundwater and soil samples. A final BRA for the SWP was issued by EPA in 2014 (EPA, 2014). A RI Report (November 2016) and FS Report (December 2016) were submitted by Beatrice Company. EPA then prepared an FS Report Addendum – Technical Memorandum for the SWP (July 2017) which modified sections of the FS. Under this ROD, the SWP cleanup has been designated as Operable Unit 4 (OU4).

The selected remedy addresses principal and low-level threat wastes at the SWP by: 1) the excavation and off-site disposal of principal threat waste source soils and NAPL; 2) the excavation and off-site disposal low-level threat wetland sediments/soils; 3) the capping of remaining low-level threat soils to eliminate exposure to these soils; and 4) the treatment of contaminated groundwater to restore groundwater to levels protective of human health and the environment.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Based on technology and space considerations, EPA concluded that it was impracticable to excavate and treat the chemicals of concern in soils, sediments, and NAPL in a cost-effective manner. However, backfilling NAPL and deeper soil excavations with amendment will provide localized soil and groundwater treatment, and dewatering activities associated with implementing the soils, sediments and NAPL work will provide treatment of water prior to discharge. In addition, the selected remedy for groundwater will satisfy the statutory preference for treatment. Thus, the overall selected remedy partially satisfies the statutory preference for treatment as a principal element of the remedy.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (and groundwater and land use restrictions are necessary), a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

F. SPECIAL FINDINGS

Issuance of this ROD embodies the following specific determinations:

Wetland Impacts

Pursuant to Section 404 of the Clean Water Act (CWA), 44 C.F.R. Part 9, and Executive Order 11990 (Protection of Wetlands), EPA has determined that there is no practicable alternative to conducting work that will impact wetlands of the United States because significant levels of contamination exist within wetlands of the United States and these areas are included within the SWP's cleanup areas.

For those areas impacted by cleanup activities, EPA has also determined that the cleanup alternatives that have been selected are the Least Environmentally Damaging Practicable Alternatives (LEDPA), as required by the CWA, because they will permanently remove contaminants that are impairing the wetlands and any wetland resources altered by the cleanup will be restored to the original grade and with native vegetation.

EPA will minimize potential harm and avoid adverse impacts on resources, to the extent practical, by using best management practices to minimize harmful impacts on the wetlands, wildlife or habitat. Wetlands will be restored and/or replicated consistent with the requirements of federal and state wetlands protection laws.

Floodplain Impacts

The cleanup plan selected by EPA includes activities that result in the occupancy and modification of the 500-year floodplain. Pursuant to Federal Emergency Management Agency (FEMA) regulations at 44 C.F.R. Part 9, which set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988 (Floodplain Management), EPA has determined that there is no practicable alternative to altering floodplain resources.

EPA will avoid or minimize potential harmful temporary or permanent impacts on floodplain resources within the 500-year floodplain to the extent practicable at the cleanup areas including the Murphy Wetland. In addition, any lost flood storage capacity from cleanup activities within the 500-year floodplain will be addressed as appropriate. The remedy includes provisions for no net flood storage loss (*e.g.*, soil removal prior to cap installation so no net flood storage loss, sediments removed and clean wetland soils backfilled to original grades, *etc*.).

Toxic Substances Control Act

In accordance with the requirements under the Toxic Substances Control Act (TSCA) and 40 C.F.R. § 761.61(c), EPA has made a finding that the manner of sampling, storage, cleanup and disposal of PCB-contaminated soil, wetland sediment/soil, groundwater and NAPL as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment as long as the following conditions are met:

- The selected contractor for the PCB remediation work shall submit a contractor work plan describing the containment and air monitoring that will be employed during PCB remedial activities, including but not limited to site control, excavation, handling, storage, and disposal activities. This work plan should also include information on how and where all PCB remediation waste will be accumulated/stored prior to off-site shipment/disposal and how the PCB remediation waste will be disposed of; how storm water controls and runoff will be managed; how dust levels will be controlled and monitored; and how field equipment will be decontaminated.

- Soil in the “Northern Whitney Soil Area” contains concentrations of PCB higher than other areas (by 10 to 100 times) attributable to the former drum storage and washing operations area and the former floor drain line on both the Whitney and Aberjona Properties. Excavation of soils in the Northern Whitney Soil Area will include all soils with total PCBs ≥ 50 parts per million (ppm) and soils with residual Non-Aqueous Phase Liquid (NAPL). Excavation is assumed to include excavation of soils below the water table. Water removed from the excavations will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (e.g., Aberjona River) or appropriated off-site disposal at a permitted facility, or appropriate POTW. In areas where soil with total PCBs ≥ 50 ppm extend into the water table, the saturated soils will be excavated to approximately 15 feet in depth. Excavated soils will be moved to a stockpile area for dewatering and stabilization to facilitate transport to the disposal facility. Any free water generated from the dewatering process will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil, as necessary for off-site disposal. Prior to off-site disposal, the soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils into trucks for off-site disposal is also possible if the soil has been pre-characterized and is sufficiently dry. An amendment will be mixed into soil below the water table to reduce/destroy VOC contamination in soil and will also result in reduction of PCB mobility. The area will then be backfilled and compacted to pre-excavation elevations using clean fill. All PCB-contaminated soils with ≥ 50 ppm will be disposed off-site at a TSCA-approved disposal facility or a Resource Conservation and Recovery Act (RCRA) hazardous waste landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)(*2*)(*iii*). Confirmatory sampling will be conducted in accordance with 40 C.F.R. Part 761, Subpart O to document that all PCBs with ≥ 50 ppm have been removed and to support that PCB concentrations are < 50 ppm for off-site disposal if additional soil removal is required.

- NAPL-related PCB impacts at two other locations on the Murphy Property contain significantly impacted soils (*e.g.*, total PCBs ≥ 50 ppm) from former waste oil management operations. The excavations will proceed approximately 5 to 6 feet into the water table to a total depth of approximately 12 feet below grade. Sidewall excavation delineation from pre-design and post-excavation bottom samples will be collected and tested to confirm that the NAPL is completely removed, to the extent practicable. Water removed from the excavations will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at permitted facility, or appropriate approved POTW. A survey will be conducted to document the final excavation depth and in each area sampling will be conducted per 40 C.F.R. Part 761, Subpart O to document that all soils with PCBs ≥ 50 ppm have been removed. Excavated soils will be moved to a stockpile area for dewatering and stabilization, if necessary, to facilitate transport to the disposal facility. Any free water generated from the dewatering process will be tested and treated if necessary to meet TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil/NAPL, as necessary for off-site disposal. Prior to off-site disposal, the soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils into trucks for off-site disposal is also possible if the soil has been pre-characterized (via *in situ* sampling) and is sufficiently dry. The area will be backfilled and compacted to pre-excavation elevations using clean fill and an amendment mixed in to soil below the water table. These NAPL-related PCB-contaminated soils at the Murphy property with ≥ 50 ppm shall be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)*(2)*(*iii*).

- Remaining PCB remediation waste in upland soils at the SWP that exceed risk-based cleanup levels will be under a protective cap consisting of a uniform placement of concrete, engineered asphalt/bituminous concrete, engineered impermeable cap, or similar material of minimum thickness spread over the area where PCB remediation waste has been left in place in order to: a) prevent/minimize human exposure and reduce ecological impacts, b) prevent/minimize infiltration of water, and c) prevent/minimize erosion per 40 C.F.R. § 761.61(a)(7). Institutional Controls will be used to protect the integrity of the protective caps. PCB-contaminated soils that need to be excavated as part of the cap construction to provide no net flood storage loss will be moved to a stockpile area, dewatered, and stabilized to facilitate transport to a disposal facility. Water removed from the excavations or from soil dewatering will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil/NAPL, as necessary for off-site disposal. Prior to off-site disposal, the soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils into trucks for off-site disposal is also possible if the soil has been pre-characterized and is sufficiently dry. PCB-contaminated soils shall be disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)(*2*)(*iii*). Alternatively, PCB-contaminated soils may be disposed at a state-permitted landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)(*2*)(*ii*) provided *in situ* (prior to excavation) sampling confirms PCB concentrations are < 50 ppm. Confirmatory sampling will not be required where remaining PCB-contaminated soil will be under the protective cap.

- All PCB-contaminated upland soils exceeding 1 ppm total PCBs shall be subject to institutional controls restricting residential, school, and daycare uses.

- For the wetland area, the lower of the applicable human health and ecological cleanup levels will be applied for the remedial actions (i.e., 1.9 ppm total PCBs for wetland sediment and 1.3 ppm total PCBs for wetland soil). All wetland sediment/soil with PCB concentrations at or above these cleanup levels will be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)(*2*)(*iii*). Water removed from the excavations or from sediment/soil dewatering will be tested and treated if necessary to meet the discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil/NAPL, as necessary for off-site disposal. Prior to off-site disposal, the sediment/soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils/sediments into trucks for off-site disposal is also possible if the soil/sediment has been pre-characterized and is sufficiently dry. Confirmatory sampling will be performed to demonstrate that all wetland sediment/soil with PCB concentrations exceeding the cleanup levels have been excavated. PCB-contaminated wetland sediment/soil shall be disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)(*2*)(*iii*). Alternatively, PCB-contaminated sediment/soil may be disposed at a state-permitted landfill in accordance with 40 C.F.R. § 761.61(a)(5)(i)(B)(*2*)(*ii*) provided *in situ* (prior to excavation) sampling confirms PCB concentrations are < 50 ppm.

- Groundwater removed from the pump and treatment system will be treated, as required, to meet the TSCA PCB discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Any treatment media contaminated with PCBs will be tested and disposed of at a TSCA-approved disposal facility. Institutional controls shall be used to prevent groundwater use until groundwater cleanup levels for PCBs and all other remedial cleanup levels are achieved.

- Compliance with the PCB regulations at 40 C.F.R. Part 761 will be maintained during all phases of work involving PCB-contaminated upland soils, wetland sediments/soils, and other contaminated media including but not limited to: 40 C.F.R. Part 761 Subpart C - Marking of PCBs and PCB Items; 40 C.F.R. § 761.65 - Storage for Disposal; 40 C.F.R. § 761.79 - Decontamination Standards and Procedures; and, 40 C.F.R. Part 761 Subpart K - PCB Waste Disposal Records and Reports.

- A long-term monitoring and maintenance plan shall be developed and implemented for final compliant caps and for groundwater to ensure effectiveness of the caps in eliminating direct contact with and ensuring no migration of PCBs from OU4.

G. DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this site.

1. Chemicals of concern (COCs) and their respective concentrations
2. Baseline risk represented by the COCs
3. Cleanup levels established for COCs and the basis for the levels
4. Current and future land and groundwater use assumptions used in the baseline risk assessment and ROD
5. Land and groundwater use that will be available at the Site as a result of the selected remedy

6. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected
7. Decisive factor(s) that led to selecting the remedy

H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for soil, non-aqueous phase liquid (NAPL), groundwater, and wetland sediment/soil at SWP (OU4) portion of the Wells G&H Superfund Site. This remedy was selected by EPA with concurrence of the Massachusetts Department of Environmental Protection. A copy of the Commonwealth's concurrence letter is attached to this ROD.

U.S. Environmental Protection Agency

By: Nancy Barmakian for   Date: 09/29/17

Bryan Olson, Director

Office of Site Remediation and Restoration

Region 1

PART 2 - DECISION SUMMARY FOR THE RECORD OF DECISION

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

Southwest Properties, Operable Unit 4, Wells G&H Superfund Site

250, 252, 256, 270 and 280 Salem Street, Woburn, MA 01801

CERCLIS ID # MAD980732168

Wells G&H Superfund Site is PRP-lead.

The Southwest Properties (SWP), Operable Unit 4 (OU4), are a portion of the Wells G&H Superfund Site (Site) located in the City of Woburn in Middlesex County, Massachusetts. The SWP are approximately 13.3 acres in size and comprise a relatively small portion of the 330-acre Site. The SWP are comprised of the contiguous properties of land known as the Aberjona Property 270 & 280 Salem Street; 6.51 acres), Whitney Property (256 Salem Street; 2.67 acres), and Murphy Property (250 & 252 Salem Street; 4.14 acres). The SWP includes a wetland area (referred to as the Murphy Wetland; approximately 1.3 acres) that extends along the northern border of the SWP and into the OU1 Wildwood Source Area Property adjacent to the north. The Wildwood Source Area Property is one of five source area properties associated with OU1 of the Site.

The SWP are in a heavily developed commercial and industrial area and area generally buffered by similarly developed properties. The SWP are bordered to the east by the Aberjona River (on the eastern side of the Aberjona Property), to the south by Salem Street, to the west by the Boston and Maine (B&M) Railroad (on the western side of the Murphy Property), and to the north by the OU1 Wildwood Source Area Property. The SWP are zoned Industrial-Park (I-P) by the City of Woburn; however, a residence (the Existing Aberjona Residence) is located on the Aberjona Property. The Existing Aberjona Residence has historically been separated from the industrial portion of the Aberjona Property by fencing, asphalt pavement, and a concrete wall. Based on historical information, no industrial operations (e.g., stockpiling of scrap, storage of materials, automotive repair-related activities) are known to have been performed at the Existing Aberjona Residence. Parts of the SWP are in the 500-year floodplain as identified by FEMA. Bordering the SWP to the east, north, and west, the land is zoned Industrial Park (I-P) by the City of Woburn. Bordering the SWP immediately to the south, the land is zoned Industrial-General (I-G) by the City of Woburn.

Historical activities at the SWP, including transfer, storage and disposal of waste oil and solvent-contaminated oil at the Murphy Property, reclaiming and/or reconditioning of drums, tanks and other metal items at the Whitney Property, and automobile reclamation and storage at the Aberjona Property resulted in soil and groundwater contamination, as well as wetland sediment/soil and surface water contamination within the Murphy Wetland. Groundwater is found both in the overburden and bedrock formations and generally migrates east-northeast, towards the Aberjona River.

The Wells G&H Site was listed on the National Priorities List (NPL) on September 14, 1989 with the concurrence of the Governor of Massachusetts.

A more complete description of the Site and the SWP can be found in Section 1 of the Remedial Investigation (RI) Report (AECOM, 2016a)[2].

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

The SWP have been utilized for various light industrial operations for nearly 60 years. The following provides a historical account for each of the three properties comprising the SWP:

- Aberjona Property (270 & 280 Salem Street) - Prior to 1950, the Aberjona Property operated as a Gulf gasoline station. The Aberjona Property began operations in the mid-1950s for the sale and reconditioning of used and wrecked automobiles, and was also a gasoline service station. During operation, the property contained several hundred junked automobiles, tires, and miscellaneous car parts. Used parts were degreased in a grease pit located in the floor of the main garage. All waste fluids from the grease pit were reportedly discharged through a drain to the MDC sewer. An oil-water separator was connected between the floor drain and the sewer to collect waste oils by gravity separation prior to discharge to the sewer system. The spent solution in the grease pit was reportedly picked up by the Murphy Waste Oil Company for reprocessing. In 2007, the oil water separator was pumped and 160 gallons were shipped off the property for disposal. The grease pit has not been in use since at least late 1980s. There are also reports that one to two underground gasoline storage tanks (USTs) existed at the property from its previous use as a gas station. The USTs were reportedly located south of the main garage area. The gasoline USTs were removed around 1985. A 500-gallon diesel UST was formerly located on the northwest corner of the building, and a waste oil tank is located on the east side of the building. The 500-gallon diesel UST was removed in 2006. The Aberjona Property continues to operate as an auto repair facility in the main garage building; however, the auto reclamation business ceased operations in the late 1990's. In 2004 or 2005, several hundred junked vehicles were removed from the northern portion of the property.

- Whitney Property (256 Salem Street) - From approximately 1950 until 1985, the Whitney Barrel Company conducted drum and tank recycling and reconditioning activities, with interior cleaning of drums and exterior cleaning of tanks. Prior to 1950, the property was

[2] AECOM, 2016. Remedial Investigation Report, Southwest Properties, Wells G&H Superfund Site; November 2016.

used primarily for agricultural purposes and unknown storage. Drums, tanks and other items were brought to the back/north side of the main building, and unloaded either directly into the main building for processing, or stored in a raw warehouse north of the main building awaiting processing and/or stored outside the main building awaiting processing. Large items and tanks were cleaned outside the main building. Drums and small items were cleaned in wash tanks inside the northern portion of the main building which discharged into a floor drain. The floor drain was connected to a culvert which flowed north into the Metropolitan District Commission (MDC)/Massachusetts Water Resource Authority (MWRA) sewer (via sewer manhole). Sludges that accumulated in a settling basin connected to the floor drain were periodically collected and taken to the Woburn Landfill for disposal. Cleaned drums and small items were then painted with drum enamel paint thinned by solvent. The floor drain was reportedly filled with concrete and the discharge line to the sanitary sewer was cut and plugged following shutdown of active drum refurbishing operations circa 1985. Several fires have also reportedly occurred at the property over the years, the most recent being in 1979, at which time the main building was nearly destroyed.

- Murphy Property (250 & 252 Salem Street) - The property was used for storage of virgin oil beginning in the 1920s. By the 1950s waste oils were accepted at the facility. The operations at the Murphy Property include a transfer, storage and disposal facility for waste oil and solvent-contaminated oil. In addition, waste oils were placed on the dirt roadways within the property to control dust until 1979. The northern portion of the property was formerly known as the “oil yard,” and contained as many as 20 aboveground storage tanks (ASTs). Historical information also refers to an area known as the “oil pit” established in the 1950’s in the central portion of the property where spent waste oil filter media were disposed. Between 1987 and 1990, Clean Harbors performed a series of investigations in preparation for the property becoming an updated waste oil handling facility. All of the ASTs in the northern portion of the property were removed prior to 1989, and approximately 1,100 cubic yards of petroleum-impacted soils were excavated from the former “oil pit” area in the central portion of the property where new facility structures were built.

- Murphy Wetland - The Murphy Wetland is located between the upland portions of the SWP and the Wildwood Source Area Property. Given the location of the former “oil yard” and “oil pit” at the Murphy property and former barrel washing activities contributing to impacts within the Northern Whitney Soil Area, historic operational activities have the potential to have impacted the Murphy Wetland. In addition, the wetland likely has been impacted by releases originating from neighboring properties including the former J.J. Riley Tannery to the west (e.g., historic overflows of the sanitary sewer, discharges from a drainage swale, etc.) and Wildwood Property to the north (e.g., mixed-contaminated soil impacts), as well as from flood events with the potential to redistribute contamination between the Murphy Wetland and the adjacent properties.

- SWP-Wide Groundwater - Groundwater generally travels across the Murphy, Whitney and Aberjona Properties to the Aberjona River. Leaching has occurred from the sources identified at the SWP, where discharge of solvents, PCBs, pesticides, petroleum hydrocarbons, and possibly other chemicals, has resulted in elevated concentrations of these constituents in soil and groundwater (both overburden and bedrock) beneath the SWP.

A more detailed description of the SWP history can be found in Section 1.3 of the 2016 RI Report and Section 1.2.2 the 2016 Feasibility Study (FS) Report.

2. History of Federal and State Investigations and Response Actions

Table B-1 provides a summary of Federal and State Site investigations and removal actions.

Table B-1

Date	Action	Legal Authority	Who Undert ook	Results	Related Documents
1980	Preliminary Site Assessments	CERCLA	EPA	FIT Site Investigation Reports for Aberjona and Whitney Properties (E&E, 1980)	
1988	Site Assessment	Massachusetts Contingency Plan (MCP) 21E	PRP	Site Assessment Report for Whitney Property (GHR, 1988)	
1986-1988	Remedial Investigation/ Feasibility Study	CERCLA	EPA	RI Report (NUS, 1986), Final Supplemental RI Report (Ebasco, 1988) & Draft Final Feasibility Study Report (Ebasco, 1989)	
1988	Site Investigation	CERCLA	EPA	Sampling Report (Weston, 1988)	
1987-1989	Hydrogeologic Investigation	MassDEP RCRA B	PRP	Hydrogeologic Characterization	

Table B-1

Date	Action	Legal Authority	Who Undert ook	Results	Related Documents
		Permit		Report (Clean Harbors, 1989) for Murphy Property	
1989	Short-Term Remedial Measure	MassDEP RCRA B Permit	PRP	Removal/disposal of 1,100 cubic yards of petroleum-impacted soil from Murphy Property	
1993-1994	Remedial Investigation	CERCLA	PRP	RI Report (RETEC, 1994)	
1995	Hydrogeologic Investigation Addendum	MassDEP RCRA B Permit	PRP	Hydrogeologic Characterization Report Addendum (Clean Harbors, 1995) for Murphy Property	
1995,1996 & 1998	Site Investigation	MassDEP RCRA B Permit	PRP	Corrective Action Report Part I (1996) and Part II (1998) for Murphy Property	
2002	Immediate Response Action	MCP 21E	PRP	Discovery/ongoin g monitoring/remov al of NAPL at Murphy Property under IRA Plan (Clean Harbors, 2002)	IRA Modificatio ns (February 2003 & August 2003) and IRA Status Reports
2002-2003	Supplemental Remedial Investigation	CERCLA	PRP	Supplemental RI Report (RETEC, 2003)	
2004/2006	Baseline Risk Assessment	CERCLA	EPA	Baseline Human Health and Ecological Risk Assessment	Baseline Human Health and Ecological

Table B-1					
Date	**Action**	**Legal Authority**	**Who Undert ook**	**Results**	**Related Documents**
				(updated in 2006)	Risk Assessment (2004)
2010-2012	Supplemental Remedial Investigation	CERCLA	PRP	Second round of supplemental RI activities conducted	RI Report (2016)
2013	Vapor Intrusion Investigation	CERCLA	PRP	Evaluation of potential vapor intrusion at the Existing Aberjona Residence	RI Report (2016)
2013	Well Installation and Natural Attenuation Assessment	CERCLA	PRP	Sampling in support of MNA evaluation	RI Report (2016)
2014	Baseline Risk Assessment	CERCLA	EPA	Revised Baseline Human Health and Ecological Risk Assessment Report	RI Report (2016)
2016	Remedial Investigation	CERCLA	PRP	Remedial Investigation Report (November 2016)	Revised Baseline Human Health and Ecological Risk Assessment Report (2014)
2016	Feasibility Study Report	CERCLA	PRP	Evaluation of Remedial Alternatives (December 2016)	Revised Baseline Human Health and Ecological Risk Assessment Report (2014)

Table B-1					
Date	**Action**	**Legal Authority**	**Who Undertook**	**Results**	**Related Documents**
2017	Feasibility Study Report Addendum – Technical Memorandum	CERCLA	EPA	Updated/Revised Evaluation of Remedial Alternatives (July 2017)	2016 Feasibility & 2014 Revised Baseline Risk Assessment

Note: The SWP are also listed as three separate MassDEP Bureau of Waste Site Cleanup (BWSC) "Chapter 21-E" sites. Several Release Tracking Numbers (RTNs; 3-2198, 3-10277, 3-20410, 3-20932, 3-22144, 3-23361, 3-534, 3-14372 and 3-1146) are on file with the MassDEP for the three properties, the majority of which have reached regulatory closure under the Massachusetts Contingency Plan (310 CMR 40.0000).

3. History of CERCLA Enforcement Activities

EPA has performed a number of potentially responsible party (PRP) search related activities, including sending information requests pursuant to CERCLA § 104(e), reviewing files, and performing record searches. As a result of those PRP search activities, on June 2, 2014, EPA issued general notice of potential liability letters to the following 16 parties relative to the Southwest Properties:

1. 280 Salem Street, LLC
2. Beatrice Company
3. Boston Edison Company/NSTAR Electric and Gas Company
4. The Gillette Company
5. Goulston Technologies f/k/a George A. Goulston
6. KEK Realty Trust/John E. Whitney, III and Susan M. Whitney
7. Kingston Steel Drum/Great Lakes Container Corp./Mallinckrodt
8. Lamco Chemical Co.
9. Murphy's Waste Oil Service, Inc.
10. Old Oil Realty Trust
11. Olin Corporation
12. Organix, LLC
13. Samuel Cabot, Inc. c/o Valspar
14. Stepan Company

15. Wildwood Conservation Corporation
16. W.R. Grace & Co.-Conn.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been high. The EPA has kept the community and other interested parties apprised of Site activities through informational meetings, fact sheets, press releases, and public meetings. Below is a brief chronology of public outreach efforts.

- In April 1986, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed and involved in remedial activities.

- Local residents formed the Aberjona Study Coalition to monitor Site activities. On June 16, 2003, EPA awarded $100,000 Technical Assistant Grant (TAG) to the Aberjona Study Coalition (ASC) for the Industri-plex and Wells G&H Superfund Sites. ASC has retained a TAG consultant to review technical documents.

- Regarding OU4, in May 2014, EPA released a fact sheet describing the contamination and summarizing the results of the April 2014 baseline risk assessment report. On June 23, 2014, EPA held a public meeting to present the results of investigation activities conducted at the SWP, discuss potential risks to human health and the environment and identify next steps for the SWP, including documentation of data collected and possible cleanup options to be detailed in the RI/FS.

- On July 6, 2017, EPA mailed 29 potentially interested party letters and approximately 2,200 public notice postcards to the community announcing the Proposed Plan, July 13, 2017 information public meeting, public comment period from July 14 – August 14, 2017, and August 3, 2017 public hearing.

- On July 11, 2017, EPA posted information on the Wells G&H website announcing the Proposed Plan, July 13, 2017 information public meeting, public comment period from July 14 – August 14, 2017, and August 3, 2017 public hearing.

- On July 12, 2017, EPA issued a press release and on July 14, 2017 EPA published a notice in the Woburn Daily Times and Boston Globe newspaper announcing the Proposed Plan, July 13, 2017 information public meeting, public comment period from July 14 – August 14, 2017, and August 3, 2017 public hearing.

- On July 13, 2017, EPA made the administrative record and the Agency's Proposed Plan available for public review at EPA's offices in Boston and at Woburn Public Library, 45 Pleasant St, Woburn, MA. This will be the primary information repository for local residents and will be kept up to date by EPA. EPA also made the administrative record and the Agency's Proposed Plan available for the public review online through the internet at https://go.usa.gov/xNFws. The Proposed Plan included the following determinations: the proposed cleanup action activities that impact wetlands are the Least Environmentally Damaging Practical Alternatives as defined by Section 404 of the federal Clean Water Act and regulations promulgated under the statute; the proposed cleanup action activities that impact floodplains are to avoid or minimize potential harmful temporary and permanent impacts on floodplain resources within the 500-year floodplain to the extent practical, and any lost flood storage capacity from cleanup activities within the floodplain would be addressed as appropriate in compliance with regulatory requirements at 44 C.F.R. Part 9 and Executive Order 11988 (Floodplain Management); and consistent with Section 761.61(c) of TSCA, EPA has determined that the disposal of PCB contaminated material as described in the Administrative Record for this cleanup plan does not result in an unreasonable risk of injury to human health or the environment as long as certain conditions are met.

- On July 13, 2017**,** EPA held an informational meeting to discuss the results of the 2016 Remedial Investigation and the cleanup alternatives presented in the 2017 Feasibility Study Report Addendum – Technical Memorandum, 2016 Feasibility Study Report, and to present the Agency's Proposed Plan to a broader community audience than those that had already been involved at the Site. At this meeting, representatives from EPA answered questions from the public.
- From July 14, 2017 to August 14, 2017, EPA held a 30-day public comment period to accept public comment on the alternatives presented in the 2017 Feasibility Study Report Addendum – Technical Memorandum, 2016 Feasibility Study Report, and the Proposed Plan and on any other documents previously released to the public. An extension to the public comment period was requested, and, as a result, the comment period was extended to September 13, 2017 (see August 10, 2017 published notice below).
- On August 3, 2017, the Agency held a public hearing to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in the Responsiveness Summary, which is part of this Record of Decision.
- On August 10, 2017, EPA posted information on the Wells G&H website announcing an extension to the Proposed Plan comment period to September 13, 2017.
- On August 14, 2017, EPA mailed 29 postcards to potentially interested parties announcing an extension to the Proposed Plan comment period to September 13, 2017.
- On August 18, 2017, EPA published a notice announcing an extension to the Proposed Plan comment period to September 13, 2017 in the Woburn Daily Times and Boston Globe newspaper.

- On August 21, 2017, EPA issued a press release announcing an extension to the Proposed Plan comment period to September 13, 2017.

- All public comments received during the public comment period have been address by EPA in the attached Responsiveness Summary (Part 3 of this document).

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As with many Superfund sites, the problems at the Wells G&H Superfund Site are complex. As a result, EPA has organized the work into four operable units (OUs):

- OU1: Includes contaminated groundwater, soil, and sludge found at the five properties (i.e., W.R. Grace and Co., Inc. [Grace Source Area Property], UniFirst Corporation [UniFirst Source Area Property], Olympia Nominee Trust [Olympia Source Area Property], Wildwood Conservation Corporation [Wildwood Source Area Property], and New England Plastics Corporation [NEP Source Area Property]) identified as sources of contamination at the Site.

- OU2: The Central Area (OU2) contains three other geographic areas including the Central Area Aquifer, the Eastern Uplands, and the Northeast Quadrant. RI/FS activities were previously conducted at the SWP under OU2.

- OU3: The Aberjona River Study (OU3) was designed to investigate the nature and extent of contamination in the Aberjona River sediments and surface water.

- OU4: Includes contaminated groundwater, soil and wetland sediments/soils, as well as the presence of NAPL observed at the SWP.

The EPA selected the remedy for OU1 in the 1989 ROD. The 1991 Explanation of Significant Differences documents changes to the 1989 ROD. Under the 1991 Consent Decree between EPA and the settling defendants for the Site, the settling defendants agreed to clean up four of the five OU1 source area properties.

OU1 includes contamination source control and management of migration components, and is currently in the remedial design/remedial action phase, with construction completed at four of the source area properties.

The selected remedy for OU1 includes the following source control measures:

- Excavation and on-site incineration of approximately 2,100 cubic yards of contaminated soil. Excavated areas will be backfilled.

- *In situ* volatilization of approximately 7,400 cubic yards of contaminated soil, part of which is located in a wetlands area. *In situ* treatment will use carbon adsorption for vapor treatment.

The OU1 management of migration remedial measures include:

- Pumping contaminated groundwater from the overburden and/or bedrock aquifers, pretreatment to remove suspended solids and metals, and treatment by air-stripping to remove contaminants. Carbon adsorption will be used to treat emissions from the air stripper.

- Groundwater will be treated at separate source area treatment plants.

- Groundwater will be pumped with the objective of achieving Safe Drinking Water Act Maximum Contaminant Levels in the aquifer.

Additional measures in the OU1 remedy include:

- The removal and disposal of approximately 410 cubic yards of sludge and debris.

Also, under two separate Administrative Orders by Consents (AOCs) signed in 2003 and 2004[3], the settling defendant for the Olympia Nominee Trust property agreed to clean up the fifth source area property.

The second operable unit (OU2), also referred to as the Central Area, was identified by EPA in the 1989 ROD as an area requiring further evaluation. OU2 is comprised of the area between the five OU1 source area properties, including the SWP, but not including the Aberjona River. The 1991 settling defendants agreed to conduct the RI/FS for the Central Area.

EPA investigated the surface water and sediment associated with the Aberjona River, which flows through the Site, as the third operable unit (OU3). The Aberjona River also flows through the Industri-plex Superfund Site, located approximately 1 mile upstream of the Wells G&H Site. In 2006, EPA issued a cleanup decision for the Aberjona River for both the Industri-plex and Wells G&H sites known as the Industri-plex Operable Unit 2 (including Wells G&H Operable Unit 3, Aberjona River Study) ROD.

The SWP is located in the southwest portion of OU2. OU2 contains three other geographic areas: the Central Area Aquifer, the Eastern Uplands, and the Northeast Quadrant. The RI/FS for the Central Area is described in Appendix II of the 1991 Consent Decree, Statement of Work (SOW) Wells G&H Superfund Site.

RI work was undertaken in the Central Area by GeoTrans, Inc. of Harvard, Massachusetts (GeoTrans) on behalf of the OU1 Settling Defendants (e.g. W.R. Grace & Co., Beatrice Company (Beatrice), UniFirst Corporation, and New England Plastics. This joint RI work included background information on the SWP. The initial phase of the RI was conducted in the Central Area in 1992 to 1993, and submitted to EPA in February 1994 (known as Phase 1A RI). The Phase 1A RI, Attachment 1, included a separate RI for the SWP prepared by Beatrice, dated February 1994. This separate RI for the SWP was supplemented with an August 2003 RI report by Beatrice. Following this work, EPA issued a Baseline Human Health Risk Assessment (BRA) for the SWP in March 2004, which was later updated in February 2006. This work necessitated a third phase of RI activities at the SWP in 2010 to 2013, including additional groundwater and soil samples. A final BRA for the SWP was issued by EPA in 2014 (EPA, 2014). A RI Report (November 2016) and FS Report (December 2016) were submitted by Beatrice Company. EPA then prepared an FS Report Addendum – Technical Memorandum (July 2017) for the SWP. Under this ROD, the SWP cleanup has been designated as Operable Unit 4 (OU4). Additional investigation activities are still on-going for the Central Area Aquifer (OU2) and a remedy will be selected following the completion of the OU2 RI/FS, including a BRA for groundwater exposures.

OU4, the subject of this ROD, addresses the contamination of the groundwater, soil and wetland sediments/soils, as well as the presence of NAPL, within the SWP. This ROD addresses groundwater, soil, and wetland sediment/soil contamination. Ingestion of water extracted from the overburden and bedrock aquifers poses a future potential risk to human health because EPA's acceptable risk range is exceeded and concentrations of contaminants are greater than the Maximum Contaminant Levels for drinking water (as specified in the Safe Drinking Water Act). Migration of contaminated groundwater also poses a risk to the human health and the environment within the OU's wetlands. Exposure to soils across the SWP also poses a future risk to human health, and exposure to wetland sediments/soils and NAPL poses a current and future risk to human health and the environment. This ROD presents a comprehensive remedy for the SWP and addresses the principal threat at the SWP through excavation and off-site disposal.
The principal and low-level threats that this ROD addresses are summarized in the following table:

Principal Threat Wastes	**Contaminant(s)**	**Action To Be Taken**
NAPL and Northern Whitney Soil Area Source Soils	VOCs, PCBs, Pesticides, PAHs, Petroleum Hydrocarbons, Metals	Excavation/Off-Site Disposal
Low-Level Threat Wastes	**Contaminant(s)**	**Action To Be Taken**
Site-wide Soils and Wetland	VOCs, PCBs, Pesticides,	Capping for Site-wide Soils, including

Sediments/Soil	PAHs, Petroleum Hydrocarbons, Metals	excavations and off-site disposal of soils to facilitate capping; Excavation/Off-Site Disposal for Wetland Sediment/Soil

E. SITE CHARACTERISTICS

Section 1 of the Feasibility Study contains an overview of the RI. The significant findings of the RI are summarized below.

The chemicals of concern (COCs) are summarized in **Tables G-1** through **G-4** for surface and subsurface soil, wetland sediment/soil, and groundwater, respectively, detected chemicals are presented in Table 4-6 of the 2016 RI for Non-Aqueous Phase Liquid or NAPL. NAPL is free product material (e.g., waste oil, certain solvents) that is found in soil or groundwater due to its historic release at the ground surface and its migration into the subsurface. The NAPL observed in monitoring wells at the SWP is floating free product or globules. The COCs include but are not limited to the following:

VOCs or Volatile Organic Compounds include a variety of chemicals that are used in glue, paint, solvents, and other products and easily evaporate. Common VOCs include trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and tetrachloroethene (PCE). These compounds are found in SWP groundwater and to some extent in NAPL and soil.

Petroleum Hydrocarbons are mixtures of aliphatic and aromatic compounds composed of hydrogen and between five and 36 carbons. Gasoline, fuel oil, and waste oil are examples of petroleum hydrocarbon mixtures. Due to the historic use and releases of petroleum products at the SWP, petroleum hydrocarbon fractions are found in groundwater and wetland sediment/soil. NAPL on the Whitney and Murphy Properties is composed primarily of petroleum compound mixtures.

SVOCs or Semi-Volatile Organic Compounds are chemicals that may vaporize when exposed to temperatures above room temperature. The SVOC naphthalene is present in SWP groundwater and NAPL.

PCBs or Polychlorinated Biphenyls are manmade chemicals that were used in electrical manufacturing and were banned in 1979. They are persistent in the environment. Analytical data were collected for total PCBs and for dioxin-like PCBs, specific congeners of PCBs that display similar toxic effects to dioxin). The Whitney Property and the Murphy Property have been contaminated with PCBs due to historic waste oil handling and disposal practices. PCBs have been identified in soil, NAPL, and groundwater. Wetland sediments/soils have been contaminated with PCBs due to runoff and groundwater discharge from the adjacent uplands.

Pesticides are manmade chemicals used for the elimination of unwanted animal, insect and plant pests. Although they are designed to target non-human pests, they can also produce adverse health effects in humans. Many pesticides are also persistent in the environment. Due to the historic barrel washing activities that occurred at the Whitney Property, pesticides are present in soil, wetland sediments/soils, and SWP groundwater.

Metals are minerals that naturally occur in the Earth's crust, and may be mobilized by industrial activities or releases. Metals present in the soils, wetland sediments/soils, groundwater and NAPL at the SWP include arsenic, lead, chromium, manganese, and others.

1. Conceptual Site Model

The Conceptual Site Model (CSM) for contaminated soil, wetland sediment/soil, and groundwater at the SWP is provided in **Figure E-1**. The CSM is a three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes and potential human and ecological receptors. Potential human and ecological receptors are presented in Section G of this ROD. The CSM documents current and potential future conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for the contaminated soil, groundwater, NAPL, and wetland sediment/soil at the SWP are based on this CSM.

For the purposes of the RI, the SWP was organized into the following four areas, along with SWP-wide groundwater. The areas, including their primary sources and impacted media, are discussed below:

Aberjona Property - The property was operated from the mid-1950s to the late 1990s as an auto reclamation, used parts and car storage area. The following primary sources of contamination have been identified at this property:

- Historical storage and burning of junk cars;
- Gasoline and waste soil USTs;
- Degreasing operations and releases of VOCs to an oil/water separator via a floor drain before discharge to the sanitary sewer; and
- Incidental releases (e.g., fluids from junk autos and dismantled auto parts).

Soil was the impacted media by the contaminants released from the primary sources. The contaminants in soils at the Aberjona Property are primarily VOCs, petroleum hydrocarbons, SVOCs, and metals.

Whitney Property - The property was operated as a drum, tank, and machinery reconditioning facility from approximately 1950 until 1985. The following primary sources of contamination have been identified at this property:

- Discharge of drum waste and cleaning fluids into a floor drain (connected to the MDC/MWRA sewer);
- Direct releases (VOCs and oil/grease) to an MDC sewer manhole;
- Historic activities and storage practices leading to direct release of drum waste onto the ground; and
- Various building fires releasing petroleum or other hazardous substances.

NAPL has been identified in the subsurface at this property (refer to **Figure E-2**). Soil, wetland sediments/soils and groundwater were the impacted media by the contaminants released from the primary sources. The contaminants in soils at the Whitney Property are primarily VOCs, petroleum hydrocarbons, SVOCs, PCBs, pesticides, and metals.

Murphy Property - The property was used to store virgin oil beginning in the 1920s and in the 1950s, waste oils were accepted at the facility. The following primary sources of contamination have been identified at this Property:

- “Oil yard” waste oil and solvent-contaminated oil ASTs;
- Disposal of waste oils and solvent-contaminated oil in the “oil pit”;
- Historic spills of fuel oil and reclaimed oil; and
- Direct application of waste oils onto dirt roads to suppress dust.

NAPL has been identified in the subsurface at the Murphy Property (refer to **Figure E-2**). Soil, wetland sediments/soils, and groundwater were the impacted media by the contaminants released from the primary sources. The contaminants in soils at the Murphy Property are primarily VOCs, petroleum hydrocarbons, SVOCs, PCBs, and metals.

Murphy Wetland - While this wetland was not used for commercial operations, it received contamination from sources on adjacent upland areas including, but not limited to:

- NAPL from the Murphy Property oil yard and oil pit;
- Sanitary sewer overflows;
- Periodic flooding of the adjacent Murphy and Whitney Properties, which likely released contamination to the wetland;

- Overland runoff from rainfall events which transported contamination associated with surficial soils and spills to the wetland;

- Drainage in a swale directly from the former John J. Riley Tannery property that caused sediment deposition in the northern portion of the wetland by the railroad culvert;

- Breaks in the MDC sewer line leading from the Whitney Property building; and

- Discharge of contaminated groundwater.

The contaminants in wetland sediment/soil at the Murphy Wetland are PCBs, VOCs, petroleum hydrocarbons, and metals.

SWP-wide Groundwater – Groundwater flow is generally from southwest to northeast across the Murphy, Whitney and Aberjona Properties of the SWP towards the Aberjona River. The above Murphy Property, Murphy Wetland, Whitney Property and Aberjona Property contribute to groundwater impacts across the SWP.

The major aspects of the CSM for the SWP are as follows:

Primary Release Mechanisms - Spills, releases, and other operational incidences led to the release of contamination onto the surface soil. Former USTs, the oil pit, and releases to drain/sewer lines led to the release of contamination in the subsurface soils and groundwater. The spills and releases resulted in NAPL formation in the subsurface at the Murphy and Whitney Properties. Once the soils were contaminated and NAPL was present, the contamination migrated to other media in a variety of ways. The most likely primary routes of migration include the following:

Primary and Secondary Transport Mechanisms - The most likely primary routes of migration include the following:

- Leaching to Groundwater – Leaching moves surficial contamination from surface and subsurface soils to the groundwater. In addition, contaminants in NAPL may dissolve into groundwater on the Murphy and Whitney Properties. The groundwater, on a site-wide basis, has been contaminated by several metals, VOCs, petroleum hydrocarbons, SVOCs, pesticides, and PCBs. Leaching may occur as a result of precipitation or flooding for VOCs and petroleum fractions. Some contaminants, such as organic compounds with low organic carbon partitioning coefficient (K_{oc}) factors, may be more likely to be present in porewater of the soils, making leaching of these compounds a preferential pathway;

- Volatilization to Soil Gas - VOCs released to the soils and groundwater may cause VOC release to the soil gas by volatilization under buildings or within a trench excavation and may potentially enter buildings or trenches if present;

- Preferential Migration Pathways - The potential exists for utilities, drains, etc. to act as preferential groundwater pathways at the SWP. Structural features including the presence of impermeable surfaces (e.g., pavement, buildings, etc.) and utilities and associated bedding material (e.g., MWRA sewer line) can locally influence the shallow groundwater system. Subsurface utilities, including water lines, sewer lines and storm drains, can provide preferential pathways for groundwater flow, creating localized discharge points, as well as soil gas migration;

- Physical Processes - Contaminants in soils can be moved directly via the movement and placement of soils. Overland flow that may occur during flooding that may suspend soils or sediment and create a re-distribution of these materials and the associated contaminants. Runoff and erosion processes occurring during weather events, such as rain or wind, may move surficial soils and associated contaminants overland towards lower areas (e.g., the Murphy Wetland). From these processes, soils and sediments not directly part of the operations or release areas may be impacted; and

- Groundwater/NAPL Discharge - Contaminated groundwater and NAPL may also discharge into the Murphy Wetland area as seeps and can produce sheens. Seeps are direct discharge of groundwater to shallow wetland sediment/soils. In general, the potential discharge of groundwater to the Murphy Wetland area may occur primarily from the Murphy Property.

2. Site Overview

The Site is comprised of a 330-acre triangular shaped tract of land within the Aberjona River Valley bounded by Route 128/Interstate 95 to the north, the Boston & Maine (B&M) Railroad right-of-way to the west, and Salem Street, Cedar Street, and Interstate 93 to the south (**Figure A-1**). The Central Area (OU2) is comprised of the area between the five OU1 source area properties, not including the Aberjona River. The SWP (OU4) are located in the southwest portion of the Site near the intersection of Salem Street and the B&M Railroad right-of-way.

The SWP are approximately 13.3 acres in size and comprises a relatively small portion of the 330-acre Site. The SWP are comprised of contiguous properties of land known as the Aberjona Property, Whitney Property, and Murphy Property as shown on **Figure E-3**). The SWP includes a wetland area (referred to as the Murphy Wetland; approximately 1.3 acres) that extends along the northern border of the SWP and into the Wildwood Source Area Property adjacent to the north.

The SWP are bordered to the east by the Aberjona River on the eastern side of the Aberjona Property, to the south by Salem Street, to the west by the B&M railroad on the western side of the Murphy Property, and to the north by the Wildwood Source Area Property.

The SWP are located in a heavily developed commercial and industrial area. The three properties themselves are zoned Industrial Park. A residence is located on the Aberjona Property. The Murphy Wetland, comprised of a seasonally ponded area and a forested/scrub-shrub wetland area and intermittent stream, extends along the northern border of the SWP between the Murphy / Whitney Properties and the Wildwood Property to the north, and it also extends partway between the Murphy and Whitney Properties (**Figure E-3**). Much of the SWP are also in the 500-year floodplain as identified by FEMA as shown on **Figure E-4**.

To the west of the B&M railroad tracks is the former John J. Riley Tannery site, which was once part of the former John J. Riley leather tannery. This property is located uphill from the SWP and is connected to the Murphy Wetland by a stormwater culvert that passes beneath the railroad tracks and discharges into the Murphy Wetland (**Figure E-3**).

The Murphy Property is currently leased by Clean Harbors and is an active transfer, storage and disposal facility for waste oil and solvent-contaminated oil. The facility is registered under RCRA as a Treatment, Storage and Disposal Facility (TSDF). Offices for the operation are housed in a former residence adjacent at 250 Salem Street. Currently the Whitney Property and associated structure is used by a number of businesses, including construction, landscaping, tree removal, and automotive repair.

The Aberjona Property continues to operate as an auto repair facility in the main garage building, with an automotive storage area and a fence-enclosed-locked dog exercise facility is located in the northern portion of the property. A house (the Existing Aberjona Residence) is also present in the southeast portion of the Aberjona Property bordering the Aberjona River and Salem Street.

Additional surface features include mature vegetation and trees line the northern property boundary along each property within the SWP, with open central areas that accommodate various work activities at each property. Trunk lines for the City of Woburn and MWRA sanitary sewers run along the access road between the Whitney and Aberjona Properties (**Figure E-3**). In addition, a City of Woburn sanitary sewer and easement is present at the Murphy Property. The sewer runs across the northern section of the SWP in an east/west direction and connects with the sewer line running down the access road to the Wildwood Source Area Property and connecting to the sewer under Salem Street (**Figure E-3**). The sewer line originates to the west of the Murphy Property within the former John J. Riley Tannery property.

Topography

The topography of the SWP slopes gently from the west to the east towards the Aberjona River. Elevations across the SWP range from approximately 38 feet above mean sea level (msl) in the localized wetland area between the Murphy and Whitney Properties to approximately 70 feet above msl in the southwest corner of the Murphy Property. Bedrock outcrops are present along the western boundary of the Site in the vicinity of the SWP. The major drainage features in the vicinity of the SWP include the wetland intermittent stream that borders the northern edge of the SWP, and the Aberjona River along the eastern boundary of the SWP.

Geology

The Central Area (OU2) and SWP (OU4) portions of the Wells G&H Site are underlain by unconsolidated Pleistocene glacial deposits that overlie crystalline bedrock. The sequence of the unconsolidated deposits from the bedrock to the ground surface includes a combination of glacially deposited lodgment and ablation tills overlain by stratified drift deposits overlain by more recent swamp/fluvial deposits and anthropogenic fill. The fill is typically comprised of light-gray to dark-brown sand mixed with subangular gravel and silt and in some areas contains varying amounts of ash, brick, metal, plastic and/or wood debris.

Bedrock at the SWP is comprised primarily of granodiorite characterized as the Salem Granodiorite, the Dedham Granite, and undifferentiated metavolcanics. A bedrock valley underlies the SWP area and trends roughly north-south, rising steeply from the base of the valley to the east towards the intersection of Washington Street and Route 128. Published data notes that the region is cut by numerous faults, formed and commonly re-activated over a long period of time, mostly trending northeast and east. There appears to be no systematic orientation of the bedrock fractures at these locations. Fractures/fracture zones may exist locally within the Wells G&H Site and these fractures/fracture zones may preferentially control groundwater flow and migration of contaminants in the bedrock groundwater system. Bedrock data from SWP indicate that the bedrock is competent, however, localized fracture zones may be present that may yield low volumes of water and may serve as migration pathways.

Hydrogeology

Groundwater at the SWP originates directly via local rainfall recharge as well as rainfall recharge originating outside the SWP boundary and flowing on to the SWP. Groundwater exits the SWP via discharge to the local wetlands and surface water bodies, in particular, the Aberjona River. Under non-pumping conditions, regional groundwater flow directions are generally toward the Aberjona River. Near the center of the valley, groundwater flow converges toward and discharges to the Aberjona River. With respect to the SWP, groundwater flow under non-pumping conditions is generally to the east, towards the Aberjona River in both unconsolidated soils and shallow bedrock. Conceptually, vertical hydraulic gradients are typically downward on the valley flanks and upward in the center of the valley. The upward hydraulic gradients in the central portion of the valley indicate groundwater discharge into the Aberjona River and associated tributaries and wetlands.

3. Remedial Investigation Sampling Strategy

An extensive sampling effort was completed to support the RI, BRA and FS for the SWP. Physical and analytical data have been collected to develop the CSM and identify the nature and extent of SWP-related constituents in the environment. Several phases of investigation have been conducted at the SWP as follows:

<u>Remedial Investigation (1994)</u> - The first phase of RI work was conducted in accordance with the EPA approved RI/FS Work Plan for OU2 of the Wells G&H Site. The RI for OU2 was undertaken by several of the settling defendants (Beatrice, UniFirst Corporation and W.R. Grace

& Co.), and included the SWP. In addition, a separate RI was undertaken by Beatrice which specifically addressed the SWP. The results of this work were reported in a Draft RI Report dated February 1994. The RI determined that the principle environmental concerns on the SWP were attributed to the industrial operations conducted on the three properties. Specifically, the Aberjona Property had groundwater contamination likely related to the use of solvents and degreasers. The Whitney Property had widespread, low level concentrations of VOCs, PCBs and pesticides in soil and groundwater. The Murphy Property had petroleum contaminated soils and groundwater impacted by VOCs (e.g., 1,1-dichloroethene and TCE) at concentrations above the Safe Drinking Water Act (SDWA), Maximum Contaminant Levels (MCLs).

<u>Murphy Property RCRA B Permit-related Investigations</u> - A number of investigation activities have been conducted at the Murphy Property (250 & 252 Salem Street) since the early 1980s. These activities include several phases of RCRA Corrective Action Investigations between 1988 and 1998, performed pursuant to the RCRA Part B Permit issued to Murphy’s Waste Oil Service, Incorporated by the Commonwealth. Activities included installation of borings and monitoring wells, soil and groundwater sampling, and wetland sediment/soil sampling in the Murphy Wetland.

Results of the investigation activities at the Murphy Property verified findings of previous investigations which identified oil-impacted soils primarily in the area of the former "oil pit" in the central portion of the property and the area of the former ASTs in the northern portion of the property. Elevated concentrations of COCs, including petroleum compounds, PAHs and VOCs, were detected throughout these portions of the property. In addition, elevated concentrations of VOCs in groundwater were confirmed at the Murphy Property. Sampling of wetland sediments/soils confirmed and helped to delineate the distribution of petroleum compounds, PCB, lead, and chromium impacts.

In addition, other limited investigations have been conducted under the MCP from 2001 to the present at the Murphy Property. MCP Immediate Response Action (IRA) activities include NAPL measurements and removal (when encountered). The presence of NAPL is related to historic operations at the facility, including the use of the “oil pit” for disposal of spent waste oil filters and/or as a result of releases of waste oil from the former AST area (“oil yard”). During the 2001 to 2015 period, the maximum levels of NAPL product measured in monitoring wells by Clean Harbors on the Murphy Property includes 1.80 ft at MW-7, 1.43 ft at MW-16, 0.01 ft at MW-23, 3.40 ft MW-24 and 0.44 ft at MW-25. During the period of July 2014 to July 2015, NAPL thicknesses were observed in wells MW-16 (up to 1.16 ft), MW-24 (up to 2.30 ft), and MW-25 (up to 0.17 ft).

<u>Supplemental Remedial Investigation (2002 to 2003)</u> – At the request of EPA, additional investigation activities were performed to update and supplement information regarding the SWP and collect additional data in support of the BRA. The results were reported in the Supplemental Remedial Investigation Report dated August 2003 (Supplemental RI). The Supplemental RI concluded that the distribution of chemicals in the subsurface was consistent with the history of

commercial use at the SWP. Areas of former commercial activity, such as the waste oil storage and transfer at Murphy Property, the barrel refinishing at Whitney Property, and the auto junk yard and repair facility at Aberjona Property, were confirmed as likely or potential source areas. Areas where no past commercial use occurred were used to evaluate background conditions. The Supplemental RI also confirmed that primary COCs in soils, wetland sediments/soils and groundwater at the SWP included VOCs, petroleum hydrocarbons, PAHs, pesticides, PCBs and metals.

Following completion of the Supplemental RI and making use of data collected prior to 2002, a Baseline Human Health Risk and Ecological Risk Assessment was prepared for SWP in March 2004. Due to an error, the 2004 Baseline Human Health Risk Assessment was revised and "page-changes" to correct the error were published in February 2006.

Supplemental Remedial Investigation (2010 to 2013) - In response to EPA's May 14, 2009 draft comment letter on the August 2003 Supplemental RI for the SWP, additional investigation and evaluation activities were conducted at the SWP between 2010 and 2013 to further delineate the extent of impacts and further support the BRA. The primary objectives of the Supplemental RI were to address data gaps identified by EPA in previous investigation activities and evaluate current contaminant conditions at the SWP.

As part of the Supplemental RI work, NAPL samples were collected on December 21, 2012 from wells MW-16, MW-24 and MW-25 for analysis of VOCs, VPH/EPH, TPH, PCB congeners, petroleum fingerprinting, density and viscosity. For the petroleum finger printing, the majority of the material detected within the samples eluted within the C20-C38 oil range organic (ORO) range. The pattern of the material detected closely resembled the motor oil reference standard used for calibration. Considering the concentrations of various compounds within NAPL (such as 1,2-cis-DCE at 1,500,000 µg/kg, PCBs at 282,000 ng/g, naphthalene at 1,200,000 µg/kg, and C11-C22 aromatic hydrocarbons at 84,200 µg/kg), the NAPL at the Murphy Property likely contributes to VOC, PCB, SVOC and petroleum impacts in groundwater and the adjacent Murphy Wetland.

A further evaluation of potential vapor intrusion was conducted at the Aberjona Residence in accordance with an EPA approved Vapor Intrusion Assessment Work Plan in 2013. The investigation activities included a building survey to document the condition of the foundation, building materials, heating, ventilating and air conditioning (HVAC) systems if any, any preferential vapor migration pathways, and to inventory any chemical products stored at the property. Sub-slab soil vapor, indoor air, and ambient air samples were collected in April and August 2013.

During 2013, additional well installation and a Monitored Natural Attenuation (MNA) investigation was also conducted at the SWP in accordance with an EPA approved Revised Work Plan for Installation of Monitoring Wells and Monitored Natural Attenuation Groundwater Sampling. The supplemental investigations were conducted to evaluate the potential for natural attenuation processes to be occurring at the SWP, to further evaluate NAPL composition, and to further characterize bedrock conditions. The data presented in this RI were used to develop a detailed analysis and evaluation of potential remedial alternatives that are presented in the accompanying revised Feasibility Study (AECOM, 2016) to address areas of unacceptable human health or ecological risk.

4. Nature and Extent

Consistent with previous environmental investigation activities conducted at the SWP, the following summarizes the nature and extent impacts (organized by media):

- *Soils* - The delineation of soil contamination is generally defined by the horizontal and vertical extent of COCs at concentrations greater than the cleanup levels in **Table L-2** and as shown on **Figures E-5, E-6 and E-7**. The COCs in soils include metals, VOCs, petroleum hydrocarbon fractions, SVOCs, pesticides, and PCBs. Areas of elevated metals are primarily associated with:
    - The area behind the Whitney Property adjacent to the former drum washing operations area and along the former drain line (Northern Whitney Soil Area); and
    - At the Murphy Property, in and around the former waste oil AST area and the former oil pit.

  Metals concentrations generally decreased with depth, with the exception of lead and thallium at the Murphy Property which had higher concentrations in soil samples collected from 6 to 15 ft bgs in the area of the former oil pit. The pattern of VOC concentrations appears to primarily be associated with the former drum washing operations area at the Whitney Property and the former waste oil AST storage area (known as the “oil yard”) and the former oil pit area at the Murphy Property. As with VOCs, the distribution of petroleum hydrocarbon fractions at the Whitney Property are primarily associated with the former drum washing operations area and along the former drain line. At the Murphy Property, petroleum hydrocarbon fraction impacts are associated with the former waste oil AST storage area and the former oil pit area. At the Aberjona Property, petroleum hydrocarbon fraction impacts are associated with the former 500-gallon diesel UST at the northeast corner of the main building, near the former floor drains and waste oil tank on the east side of the building, and the area immediately to the north of the main building. The distribution of dieldrin, representative of pesticide impacts, indicates that the distribution of pesticides is correlated with the former drum washing operations area and floor drain at the Whitney Property. Similarly, the distribution of PCBs shows a clear correlation to the former drum washing operations area and floor drain line on the Whitney Property and with the former waste oil AST area at the Murphy Property where an historical release of oil was documented.

- *Wetland Sediments/Soils* – The extent of contamination in wetland sediments/soils (**Figure E-8**) is largely defined by areas where chromium, lead, and PCBs, and to a lesser degree concentrations of zinc and C_{11}-C_{22} aromatic petroleum hydrocarbon fraction, exceed human health and/or ecological cleanup levels in **Tables L-3 and L-4**, respectively. The source of the elevated chromium in the wetlands is likely attributed to a combination of historical erosion from the Murphy and Whitney Properties, historic sewer overflows within the wetland north of the Murphy Property, and deposition from erosion of the drainage swale at the former John J. Riley Tannery property, and the erosion of fill that is located over the entire surface of the SWP. The presence of lead and PCBs in wetland sediments/soils is attributed to the presence of historic runoff from the Whitney Property and the Murphy Property and the presence of NAPL at the Murphy Property near the wetland that occasionally results in visible sheen on the surface water in the wetlands.

- *Surface Water* - Surface water is present intermittently in wetland portions of the SWP. Aluminum, chromium, cobalt, iron, manganese and total cyanide were detected above human health and/or aquatic life screening levels. The highest concentrations of chromium and manganese were at the northeast corner of the Murphy Property. The highest concentration of iron was found at the western edge of the finger of the Murphy Wetland that extends between the Murphy and Whitney Properties. The highest concentration of cyanide was found in the wetland north of the Murphy Property.

- *Groundwater* – In general, the extent of groundwater contamination within the shallow overburden, intermediate/deep overburden and shallow bedrock is limited to areas of the SWP where concentrations of COCs in groundwater exceed MCLs or risk-based cleanup levels in **Table L-1**. The overarching patterns of detections of metals, VOCs, SVOCs, pesticides, and PCBs correlated with known historical operations, historical practices, historical events, and elevated soil concentrations at the SWP including:

    - The former waste oil AST area and the former oil pit area at the Murphy Property, characterized by wells MW-16, MW-18S, MW-24, MR 206, and MW-7;
    - The former drum washing operations area and former floor drain line at the Whitney Property, characterized by a number of wells immediately to the north and east along the downgradient property boundary with the Aberjona Property (i.e., Northern Whitney Soil Area); and
    - The central portion of the Aberjona Property and main building operations area characterized by the AB-2 well cluster and adjacent wells.

    Across the SWP, CVOCs were the predominant contaminants detected in groundwater above their MCLs (or lowest TCL if an MCL does not exist). At the Murphy and Whitney Properties, petroleum fractions and other VOCs and SVOCs (e.g., benzene, benzo(a)anthracene, and naphthalene) were also found in groundwater above their MCL / lowest TCL. In addition, at the Whitney Property various pesticides (e.g., aldrin and dieldrin) and PCBs were found in groundwater above their lowest TCLs. Various metals were found in SWP groundwater, with arsenic detected behind the Whitney Building at concentrations greater than its MCL. Lead was detected above its action level at the Murphy Property in wells MW-16, MW-18S, MW-24, which are located in the area where NAPL has been observed.

Although there are exceedances of cleanup levels in the shallow bedrock, primarily for VOCs, there is a general decline in concentrations with depth consistent with vertical gradient data (typically upwards) at the SWP. This indicates that vertical gradients are favorable for limiting vertical downward migration and/or that contaminants are degrading with distance from sources (both horizontally and vertically). The groundwater contaminant plumes within the shallow overburden, intermediate/deep overburden and shallow bedrock portions of the aquifer are depicted in **Figure E-9**. The shallow overburden plume generally extends east-northeast from the former "oil pit" and "oil yard" portions of the Murphy Property to the Murphy Wetland, east-northeast from the northern portion of the Whitney Building/former drum washing area beyond the Aberjona Property line, and east-northeast from the vicinity of the former UST (AB-201 area) at the Aberjona Property toward the Aberjona River. The plume footprint within the intermediate/deep overburden is generally similar to that of the shallow overburden plume, while the lateral plume dimensions within the shallow bedrock are somewhat reduced relative to the overburden plumes. Shallow bedrock impacts are also present in the vicinity of the MW-4 well cluster at the Whitney Property.

- *NAPL* – NAPL has been observed in several wells on the Murphy Property (**Figure E-2**). As part of the Supplemental RI, wells MW-7, MW-16 and MW-24 were gauged for water level and thickness of NAPL. NAPL samples were collected from wells MW-16, MW-24 and MW-25 for analysis of VOCs, VPH/EPH, TPH, PCB congeners, petroleum fingerprinting, density and viscosity. Subsequently, NAPL samples were collected from MW-16, MW-24, MW-25 (PCBs only) for chemical analysis, and found to contain 1,2-cis-DCE up to 1,500,000 µg/kg, PCBs up to 282,000 ng/g, Naphthalene up to 1,200,000 µg/kg, and C_{11}-C_{22} aromatic hydrocarbons up to 84,200 µg/kg. Corresponding groundwater samples suggest that C_{11}-C_{22} aromatic hydrocarbons, VOCs, and PCBs are migrating from the NAPL to groundwater and wetland sediments/soils.

  At the Whitney Property, NAPL observations have been limited to well WB-201S in October 2011 and July 2013. NAPL was not observed at any other wells on the Whitney Property during the Supplemental RI investigation activities.

- *Soil Vapor* - Soil vapor from the office portion of the Murphy building had a mix of VOCs detected, including chlorinated VOCs, petroleum hydrocarbon fractions, and CFC-113. Detections in soil vapor below the building are consistent with known historic or current activities in this area, including the former oil pit that is located beneath this building or the ongoing management of waste oils. The detections of VOCs in soil vapor at the Whitney Property were expected given the distribution of VOCs in shallow groundwater and soils around the building. Overall, the soil vapor data combined with the soil and groundwater data indicate that the former drum washing operations area and floor drain line are a primary source area at the Whitney Property. A mix of VOCs were detected at the main building at the Aberjona Property. The detections are consistent with the documented historical use of the property as an auto junk and salvage yard.

At the house located on the Aberjona Property, two rounds of vapor intrusion sampling were performed in 2013. Concentrations of 1,1-dichloroethane, benzene, naphthalene, chloroform, and TCE were detected. Although the vapor intrusion pathway for chloroform and TCE (present in shallow groundwater, sub-slab soil gas and indoor air) was complete, the BRA concluded that, while TCE and chloroform were identified as indoor air contaminants of potential concern, the calculated risk levels were below EPA's risk management criteria for carcinogens and/or non-carcinogens and vapor intrusion at the Aberjona Residence does not pose a significant risk. No further action is recommended for this building.

5. Primary Sources and Routes of Migration

The release mechanisms resulting in contamination include known, documented, and suspected releases of petroleum or hazardous materials at the SWP. Based on the information concerning sources of contamination and migration pathways, the following general media are affected by releases from the SWP:

- Soil associated with the former "oil yard" and "oil pit" at the Murphy Property, the former drum washing area and drain line at the Whitney Property, and in the vicinity of the former UST at the Aberjona Property;
- Wetland sediments/soils within the Murphy Wetland;
- Surface water within the Murphy Wetland;
- Overburden and shallow bedrock groundwater beneath the SWP; and
- NAPL within the Murphy Property (MW-7 and MW-16 areas) and Whitney Property (WB-201 area).

The Aberjona River is a receiving medium for overburden groundwater. However, Site-related contamination has not accumulated in the river as described in the Aberjona River Study which was designed to investigate the nature and extent of contamination in the Aberjona River sediments and surface water as well as evaluate potential human and ecological risks. EPA merged the Wells G&H Aberjona River Study with the Industri-plex Operable Unit 2 (OU2) Multiple Source Groundwater Response Plan (MSGRP) RI/FS. On January 31, 2006, EPA released the Industri-plex OU2 (including Wells G&H OU-3) ROD.

The details of the fate and transport of constituents present in contaminated media (soil, wetland sediment/soil, surface water, groundwater, NAPL and soil vapor) for the main constituents detected at the SWP are as follows:

Sources

Murphy Property - The COCs identified in media at the Murphy Property are primarily VOCs, petroleum hydrocarbons, SVOCs, PCBs, and metals. The following primary sources of contamination have been identified at this property:

- Oil yard waste oil and solvent-contaminated oil ASTs;
- Disposal of waste oils and solvent-contaminated oil in the oil pit;
- Historic spills of fuel oil and reclaimed oil; and
- Direct application of waste oils onto dirt roads to suppress dust.

Whitney Property - The COCs identified in media at the Whitney Property are primarily VOCs, petroleum hydrocarbons, SVOCs, PCBs, pesticides, and metals. The following primary sources of contamination have been identified at this property:

- Discharge of drum waste and cleaning fluids into a floor drain (connected to the MDC/MWRA sewer);
- Direct releases (VOCs and oil/grease) to an MDC sewer manhole;
- Historic activities and storage practices leading to direct release of drum waste onto the ground; and
- Various building fires releasing petroleum or other hazardous substances.

Aberjona Property - The COCs in media at the Aberjona Property are primarily VOCs, petroleum hydrocarbons, SVOCs, and metals. The following primary sources of contamination have been identified at this property:

- Historical storage and burning of junk cars;
- Gasoline and waste soil USTs;
- Degreasing operations and releases of VOCs to an oil/water separator via a floor drain before discharge to the sanitary sewer; and
- Incidental releases (e.g., fluids from junk autos and dismantled auto parts).

Murphy Wetland - While this wetland was not used for commercial operations, it received contamination from sources on adjacent properties including:

- NAPL from the Murphy Property oil yard and oil pit;
- Sanitary sewer overflows;
- Periodic flooding of the adjacent Murphy and Whitney Properties, which likely released contamination to the wetland;
- Overland runoff from rainfall events which transported contamination associated with surficial soils and spills to the wetland;
- Drainage in a swale directly from the J.J. Riley Tannery property that caused sediment deposition in the northern portion of the wetland by the railroad culvert; and
- Breaks in the MDC sewer line leading from the Whitney Property building.

The COCs in wetland sediment/soil at the Murphy Wetland are PCBs, petroleum hydrocarbons, and metals. Metals have been detected in wetland surface water.

Routes of Migration

Most of the COCs identified are organic contaminants (VOCs, SVOCs, PCBs, and pesticides). Inorganic COCs are metals: arsenic, chromium, cobalt, iron, lead, manganese, thallium, and zinc. There are several pathways for contaminants to migrate from the point of origin at the SWP to other locations and potential receptors including:

- Air migration;
- Surface water migration;
- Wetland sediment/soil migration;
- Soil migration; and
- Groundwater migration.

Air Migration - The migration of contaminants to air is a result of entrainment of soil particles by the wind and by volatilization. The results of the soil vapor data collection and analysis best characterize the soil vapor pathway at the SWP. The analysis indicated primarily VOCs in the soil vapor data at each property. In general, the results were well correlated with historical activities at each property. In addition to migration from soil/groundwater to outdoor air, the soil vapor intrusion migration pathway is specific to migration of contaminants from soil under buildings into indoor air. Testing at the residence on the Aberjona Property showed that the vapor intrusion pathway for chloroform and TCE (present in shallow groundwater, sub-slab soil gas and indoor air) was complete.

Surface Water - Migration and redistribution of contaminants to local surface water can result from flooding or migration of surface water from upstream tributaries. Other mechanisms include groundwater discharge to surface water and surface runoff. The observations of impacts to surface water are limited to sheen on the surface water in the Murphy Wetland, which is correlated to the NAPL observed at several wells on the Murphy Property. Lead in groundwater influenced by upward hydraulic gradients, may result in migration from groundwater to surface water (and to wetland sediments). The presence of NAPL and lead at the Murphy Property is consistent with the current and historic practices of waste oil management (former "oil pit" and former "oil yard").

Wetland Sediments/Soils - Contaminants in wetland sediments/soils may be affected by periods of high river flow or storm events. Sediments mobilized by high-energy storm waters and runoff will be carried and ultimately deposited in a lower energy setting. Subsurface infrastructure (culverts, drains) may also be a pathway to contaminant migration to sediments. Soil transport from Murphy and Whitney Properties are believed to be primary sources of impacts to Murphy Wetland sediments. NAPL, particularly at the Murphy Property, is also impacting sediments. Sediments may also be impacted by upwelling of shallow groundwater. Off-site sources may also have contributed to sediment impacts, primarily chromium. For example, storm water originating from the former John J. Riley Tannery property west of the railroad tracks to the Murphy Wetland (via the drainage ditch/swale and culvert) may have transported eroded chromium impacted soils into the northern portion of the Murphy Wetland.

Soils - Impacted soils are generally believed to result primarily from discharge or disposal directly to the soils. At the Murphy Property, the historic footprints of the former "oil pit" and waste oil AST tank farm (former "oil yard") are well correlated to soil impacts at that property. The historic drums washing area and the floor drain discharge line at the Whitney Property are also very well correlated to the location of the soil impacts at that property. Soil concentrations were not high or widespread at the Aberjona Property, except for petroleum hydrocarbon fraction impacts in the area of the former 500-gallon diesel UST at the northeast corner of the main building, near the former floor drains and waste oil tank on the east side of the building, and the area immediately to the north of the main building.

At the SWP, contaminant migration from soil to groundwater may occur when there is a source of soil impacts and recharge (rainfall) to prompt the migration. The soil-to-groundwater leaching pathway is evident at the SWP based on the distribution of soil impacts and the observations of dissolved phase contaminants in corresponding groundwater samples. The NAPL observed at the Murphy and Whitney Properties also contribute to contaminant impacts in groundwater.

Groundwater - Groundwater generally becomes impacted because of direct discharge to groundwater, because of leaching from soil to the groundwater, or because of migration within the groundwater system. At the SWP, the mechanism by which contaminants enter the groundwater system is transport through the vadose zone and leaching from the soils (for volatile contaminants and petroleum hydrocarbon fractions). This is evidenced by detections of the highest concentrations of groundwater in the same areas as the highest concentrations in soils. Like soils, the overarching patterns of detections in groundwater include distinct patterns of metals, VOCs, SVOCs, pesticides, and PCBs that correlate well with documented historical operations and releases at each of the properties including the former oil AST area ("oil yard") and former waste "oil pit" at the Murphy Property, former drum washing operations area and former drain line at the Whitney Property and the main operations area and central portion of the Aberjona Property. Potential off-site sources of impacts to groundwater also exist, including impacts associated with the Wildwood Source Area Property.

Groundwater flow is generally from southwest to northeast with components of flow in the shallow overburden toward surface water bodies and wetlands. In the intermediate overburden and shallow bedrock, flow is also from southwest to northeast, roughly parallel to the Wildwood Source Area Property's southern property lines, with an eastward component of flow north of the SWP. Seasonal river changes and periodic flooding may result in short-term local scale changes to groundwater flow directions and gradients such that groundwater may be temporarily influenced by two or more sources and result in a mixing zone.

Historically, shallow groundwater gradients and directions along the boundary between SWP and the Wildwood Source Area Property have been variable because of groundwater extraction in the valley (e.g., Riley Well 2, Wells G and H). The pumping and subsequent ceasing of pumping impacted the migration from various local source areas (Murphy, Whitney, and Aberjona Properties and Wildwood Source Area Properties) toward Riley Well 2 and resulted in areas of groundwater mixing. After pumping at Riley Well 2 stopped (1989), ambient hydraulic gradients were re-established.

Estimated Volumes of Impacted Media/Waste

The estimated volumes of impacted soils, groundwater, wetland sediments/soils and NAPL are presented in the table below.

Approximate Impacted Media/Waste	**Estimated Volumes**
Impacted Soils	46,000 cubic yards
Impacted Groundwater	300,000 cubic yards

Impacted Wetland Sediments/Soils	7,000 cubic yards
Impacted NAPL	6,000 cubic yards

6. Routes of Exposure

Human Health

The potentially complete human health exposure pathways include:

- direct contact (incidental ingestion and/or dermal contact) with soil, surface water and wetland sediment/soil[4];
- inhalation of fugitive dust released from soil;
- potable use of groundwater (ingestion, dermal contact, and inhalation of vapors released from groundwater used as household tap water); and
- inhalation of potentially impacted indoor air following vapor intrusion.

Presently, the SWP is a mix of commercial buildings, an ice skating rink, and the Existing Aberjona Residence. A wetland area (the Murphy Wetland) is present between the Murphy and Whitney Properties. Potential exposures at the three commercial properties under current land use conditions were characterized using a current commercial worker scenario. This scenario assumed that adult workers will be exposed to contamination in exposed surface soil within the industrial portions of the Murphy, Whitney and Aberjona Properties under current land use conditions. This scenario also assumes that workers will be exposed to contaminants that have potentially migrated to indoor air via the vapor intrusion pathway, evaluated through a screening-level assessment of the soil vapor data.

Current older child trespasser exposures were evaluated assuming contact with exposed surface soil at the Whitney Property and with sediment and surface water within the Murphy Wetland. Current trespasser exposures at the Murphy and Aberjona Properties were not evaluated because these properties are secured with gates and fencing, or covered with asphalt or concrete. Current recreational and commercial exposures at the ice skating rink were not evaluated because the area around the rink is paved and a vapor barrier was placed during building construction to

[4] Both wetland sediment and wetland soil samples were collected from the Murphy Wetland area. The baseline human health risk assessment combined the wetland sediment and wetland soil data together, and evaluated both media combined as sediment.

mitigate the vapor intrusion pathway.

As previously mentioned, there is a residence (the Existing Aberjona Residence) present in the southeast portion of the Aberjona property. Residential exposures to soil at the Existing Aberjona Residence were not evaluated because industrial activities did not occur on this portion of the Aberjona Property. The existing house has historically been separated from the industrial portion of the Aberjona Property by fencing, asphalt pavement and a concrete wall. Based on SWP history, no industrial operations (e.g., stockpiling of scrap, storage of materials, automotive repair-related activities) are known to have been performed at the Aberjona residential area (see Appendix C of the FS for complete discussion). However, due to the presence of VOC-contaminated shallow groundwater beneath the Existing Aberjona Residence, risks to current young child and residents were characterized for the vapor intrusion pathway.

The future use of the SWP has not been determined. Therefore, exposures were evaluated for a range of possible future land uses, including trespasser, recreational and commercial. The future older child trespasser scenario assumed continued commercial use of the properties with the removal of access obstacles and exposure barriers that are currently in place, resulting in increased access to the properties and the wetland. Future older child trespasser exposures were evaluated assuming contact with surface soil at the Murphy, Whitney and Aberjona Properties and with sediment and surface water within the Murphy Wetland. The recreational use scenario evaluated young children and adults who were assumed to be exposed to soil within the three properties, as well as to surface water and sediment within the Murphy Wetland. Recreational users have a higher intensity and frequency of exposure than that assumed for trespassers.

Future commercial uses of the SWP considered soil exposures to full-time workers, as well as construction workers engaging in improvements or redevelopment of the properties. Exposures to construction workers were also characterized for direct contact with shallow groundwater exposed during excavation activities. Due to the predominant commercial/industrial nature of the surrounding area and the mapped 500-year floodplain over portions of each of the properties, future residential development of the Aberjona, Whitney, and Murphy Properties (exclusive of the Existing Aberjona Residence) is considered highly unlikely and was not evaluated in the baseline HHRA. However, Appendix C of the 2016 FS (as updated in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum) contains a screening-level risk evaluation for future residential use of the properties to document the need for Institutional Controls for future residential use due to residential risks for soil above EPA risk management criteria (Incremental Lifetime Cancer Risk [ILCR] greater than 10^{-4} or a Hazard Index [HI]>1) for each of the properties. In addition, the soil cleanup standards will not be protective of future daycare child and school-age child who would be exposed more frequently than a recreational child, and Institutional Controls will be necessary to restrict future daycare and school use. Future use of SWP-wide groundwater as tap water was evaluated for nearby young child and adult residents, assuming ingestion, dermal contact, and inhalation exposures during household water usage.

Ecological

The potentially complete ecological exposure pathways are:

- Uptake of contaminants from sediment, surface water, and wetland soil through roots (vegetation);
- Ingestion of contaminants bound to wetland soil (terrestrial invertebrates, birds, mammals);
- Ingestion of contaminants bound to sediment (benthic invertebrates, semi-aquatic wetland birds and mammals)
- Ingestion of dissolved and particulate contaminants in surface water (aquatic invertebrates, semi-aquatic wetland birds and mammals);
- Ingestion of contaminants through consumption of contaminated plants (herbivores, omnivores); and
- Ingestion of contaminants through consumption of contaminated invertebrate prey (invertivores, omnivores).

Although inhalation and dermal absorption pathways are possibly complete for some receptors, these pathways are considered to be minor compared to dietary ingestion and were not evaluated.

The exposure pathways are considered incomplete for media located below pavement, buildings or other impervious surfaces that are considered inaccessible to ecological receptors and to non-vegetated portions of the SWP. In addition, since groundwater does not directly discharge to the ground surface (e.g., through seeps), there are no direct exposures to groundwater by environmental receptors.

7. Principal Threat Waste

Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile, and/or highly-toxic source material.

NAPL (Murphy and Whitney Properties) and significantly contaminated soils (i.e., 10 times greater than the cleanup level and/or greater than or equal to PCBs at 50 mg/kg) within the Northern Whitney Soil Area (Whitney Property) are Principal Threat Wastes.

The Principal Threat Wastes at the Northern Whitney Soil Area contain the highest concentrations of PCBs (10 to 100 times higher than rest of the SWP) as well as other constituents such as chlorinated VOCs detected at the SWP, NAPL has been observed within this portion of the Whitney Property (well WB-201S), and the cancer risk associated with EPCs calculated using the 95% UCL for subsurface soil at the Whitney Property exceeds a 10^{-3} risk. It is important that the soil in the Northern Whitney Soil Area be effectively remediated because of the high concentrations of COCs, the presence of NAPL and surface suspended globules containing floating hydrocarbons, PCBs and VOCs. The Northern Whitney Soil Area is a significant source to groundwater contamination, as well as potentially other media, that must be removed or otherwise aggressively treated to destroy or immobilize COCs. Excavation of the Northern Whitney Soil Area would extend below the water table and have beneficial impacts on groundwater, including removal of source material (including NAPL) and providing the opportunity to blend the remaining contaminated soil below the water table with an amendment prior to backfilling to provide soil and localized groundwater treatment.

NAPL is a source contributor of contaminants to soil and groundwater and is present on the Murphy and Whitney Properties. NAPL associated with the former drum washing operations area at the Whitney Property is characterized by well WB-201S as noted above in association with the Northern Whitney Soil Area. The presence of NAPL associated with the former waste oil AST area (“oil yard”) and the former waste “oil pit” area at the Murphy Property, characterized by the measurement of NAPL in wells MW-16, MW-18, MW-24, MR 206, and MW-7, is also considered a Principal Threat Waste. NAPL is also potentially present in portions of the Murphy Property including the former “oil pit” and the former waste oil ASTs (“oil yard”) area. The NAPL has been identified based on forensic testing as primarily lubricating oil. Chemical analysis indicates that NAPL at the Murphy Property contains high levels of COCs including VOCs (e.g., cis-1,2-DCE as high as 1,500,000 µg/kg), PCBs (up to 282,000 nanograms per gram [ng/g]), and petroleum compounds (e.g., naphthalene up to 1,200,000 µg/kg, and C_{11}-C_{22} aromatic hydrocarbons up to 84,200 µg/kg). Corresponding groundwater samples indicate that VOCs, PCBs and C_{11}-C_{22} aromatic hydrocarbons are migrating from the NAPL to groundwater and wetland sediments. Excavation of NAPL at both the Murphy Property and the Northern Whitney Soil Area (Whitney Property) would remove and/or contain NAPL and surface suspended globules, to the extent practicable, and prevent NAPL migration, leaching to groundwater and discharge to wetlands.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing chemicals of concern that are relatively immobile in air or groundwater, low leachability contaminants or low toxicity source material. The soils and wetland sediments/soils on the SWP are considered Low-level Threat Wastes as they generally can be contained (e.g., capped) and present relatively low risk in the event of exposure.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The SWP, as well as the surrounding area, are commercially active and zoned industrial. Each property has at least one building in active use, and the properties are fenced and/or paved or covered with gravel. Trespassers may access the Murphy Wetland, but the wetland area is not currently a valuable recreational resource.

Currently, an automotive storage area and a fence-enclosed-locked dog exercise facility is located in the northern portion of the Aberjona Property. In addition, a landscaping business and a private athletic training facility utilize one of the buildings on the property. In 2008, an indoor ice skating arena was constructed on the western portion of the property. The Existing Aberjona Residence is also present in the southeast portion of the property.

Since barrel refinishing operations ceased, the Whitney Property has been used for a variety of commercial purposes including indoor and outdoor equipment storage, truck parking, a wood working shop, auto repairs, and equipment repairs. Currently the property is used by a number of businesses, including construction, landscaping, tree removal, and automotive repair.

The Murphy Property is currently leased by Clean Harbors and is an active transfer, storage and disposal facility for waste oil and solvent-contaminated oil. The facility is registered under RCRA as a Treatment, Storage and Disposal Facility (TSDF). The main facility was constructed in 1989 and 1990 and includes the waste oil facility with eleven ASTs, an office, a laboratory, and restrooms. The AST area is underlain by a concrete dike containment area and is covered by a canopy. A garage, located in the southern portion of the property, is used primarily for truck maintenance. Operations at the property include collection and gravity separation of waste oils and segregation of solids, liquids, and oils for subsequent disposal or resale. Access to the operating portion of the property is limited by fencing.

Commercial/industrial land use is assumed to continue in the future, except for continued use of the Existing Aberjona Residence for residential use and the ice skating rink for recreational use. A potential redevelopment option for the SWP includes expanded use of the properties for recreational activities with the construction of additional recreational facilities and increased access to the Murphy Wetland. Due to the predominant commercial/industrial nature of the surrounding area and the mapped 500-year floodplain over portions of each of the properties, future residential development of the Aberjona, Whitney, and Murphy Properties is considered highly unlikely and was not evaluated in the baseline HHRA. Therefore, EPA's cleanup levels for soil are based on a future recreational land use scenario, the highest anticipated use of the properties.

There is currently no potable or non-ingestion use of groundwater at the SWP since the facilities and the surrounding areas are connected to the municipal water supply. In 2004, MassDEP prepared a Groundwater Use and Value Determination for the Wells G&H Superfund Site. The purpose of the Use and Value Determination is to identify whether the aquifer at the Site should be considered of "High," "Medium," or "Low" use and value. In the development of its Determination, MassDEP applied the criteria for groundwater classification as promulgated in the MCP. The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance. MassDEP concluded a "Medium" groundwater use and value determination was appropriate for the Wells G&H aquifer because of its significant current and future ecological value to the Aberjona River and associated wetlands and its potential value as a drinking water supply in the future. Based upon this determination, future potable use of SWP-wide groundwater by a resident is possible. Therefore, EPA is proposing cleanup levels based on federal and state drinking water standards, including MCLs, and risk-based criteria that support this use as a future potential drinking water source.

G. SUMMARY OF SITE RISKS

A BRA was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the SWP assuming no remedial actions were to be taken. It provides the basis for taking remedial action when action is warranted, and identifies the contaminants and exposure pathways that need to be addressed by the remedy. The human health risk assessment (HHRA) followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the SWP, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the SWP, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of the components of the human health and ecological risk assessments which support the need for remedial action is provided below. The complete baseline human health risk assessment and ecological risk assessment can be found in the March 2014 Baseline Human Health and Ecological Risk Assessment (EPA, 2014). Updates to the 2014 BRA, based on changes to toxicity values since the 2014 BRA was completed, are presented in Appendix C of the 2016 FS and in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum.

1. Human Health Risk Assessment

A baseline HHRA, conducted pursuant to EPA Risk Assessment Guidance for Superfund (RAGS), was completed for the SWP to evaluate the likelihood and magnitude of potential human health effects associated with the current land use of the SWP, as well as possible future land uses of the SWP, which included recreational and commercial. The HHRA evaluated baseline risks which assume that current and future land uses occur in the absence of any remedial actions (EPA, 2014).[5] As previously discussed, residential land use was not evaluated in the BRA. However, Appendix C of the 2016 FS (as updated in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum) contains a screening-level risk evaluation for

[5] *EPA*, 2014. *Baseline Human Health and Ecological Risk Assessment, Southwest Properties, Wells G&H Superfund Site, Operable Unit 2, Woburn, Massachusetts.* March 2014.

future residential use of the properties to document the need for Institutional Controls to restrict future residential, school, and daycare use for each of the properties, as discussed below.

Section 1: Hazard Identification

Seventy-eight of the approximately 120 chemicals detected at the SWP were selected for evaluation in the HHRA as chemicals of potential concern (COPCs). The COPCs were selected to represent potential SWP-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 3-2.1 through 3-2.6 in Section 3 of the baseline HHRA (EPA, 2014). From this, a subset of the chemicals was identified in the HHRA and updated in Appendix C of the December 2016 FS and Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum as presenting a significant current or future risk and/or were identified at the SWP in excess of the appropriate chemical-specific applicable or relevant and appropriate requirements (ARAR)[6] value and are referred to as the COCs in this ROD. The COCs are summarized in **Tables G-1** through **G-4**. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure (RME) scenario in the baseline HHRA for the COCs. Estimates of average or central tendency exposure concentrations for the COCs and all COPCs can be found in Tables 3-3.1 through 3-3.9 in Section 3 of the baseline HHRA (EPA, 2014). All of the COCs in these tables were identified as presenting a significant future risk in the baseline HHRA except for 1,1-dichloroethene, 1,1,1-trichloroethane, and 4,4'-DDE in groundwater. Of these, 1,1-dichloroethene and 1,1,1-trichloroethane are included because their maximum detected concentrations in groundwater exceed a chemical specific-ARAR value (i.e., the MCL). 4,4'-DDE was not included as a groundwater COPC in the baseline HHRA, but it would now be included due to its recent classification as a volatile chemical. 4,4'-DDE is also now included as a groundwater COC because its maximum detected concentration is associated with a risk in excess of 10^{-6}, the trigger for inclusion as a COC if the total risk is greater than EPA risk management criteria. In addition, benzo(a)pyrene and other carcinogenic PAHs (benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) in soil and groundwater were identified as COCs in the baseline HHRA, but are no longer included as COCs (except for benzo(a)pyrene in groundwater which is retained as a COC) due to the publication of revised toxicity values in 2017. Appendix C of the 2016 FS and Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum provide discussions of changes to COPCs and COCs since the baseline HHRA was completed.

Section 2: Exposure Assessment

Exposure to chemicals of concern were estimated quantitatively or qualitatively through the

[6] ARARs are all standards, requirements, criteria or limitations under any Federal environmental law and all standards, requirements, criteria or limitations under any more stringent State environmental or facility siting law, unless a waiver is invoked, that are applicable or relevant and appropriate to implementing a CERCLA remedy.

development of several hypothetical exposure scenarios. Exposure scenarios were developed considering the nature and extent of contamination, the location of the SWP, current and future potential use of the SWP, and identification of potential receptors and exposure pathways.

Current and potential future SWP-specific pathways of exposure to COCs were determined. The extent, frequency, and duration of current or future potential exposures were estimated for each pathway. From these exposure parameters, a daily intake level for each SWP-related chemical was estimated.

Presently, the SWP are comprised of three contiguous properties of land known as the Aberjona Property, Whitney Property, and Murphy Property. The SWP are located in a heavily developed commercial and industrial area and are surrounded by similar industrial/commercial properties to the north, east, west, and south. The three properties themselves are zoned industrial. A residence (the Existing Aberjona Residence) is located on the Aberjona Property. A wetland area (referred to as the Murphy Wetland) extends along the northern border of the SWP between the Murphy and Whitney Properties. Exposures were evaluated for a range of possible future land uses, including recreational and commercial/industrial. The recreational use scenario evaluated young children and adults who were assumed to be exposed to soil, as well as to wetland surface water and sediment, if wading activities occur. The exposure evaluation associated with commercial and industrial uses of the SWP considered full-time adult workers exposed to soil. Evaluation of exposure was also performed for future construction workers exposed to SWP soils and shallow groundwater. Though the evaluation for soil exposure assuming future residential use of the SWP was not evaluated in the baseline HHRA, exposure to COPCs in SWP-wide groundwater used as a potable water source was evaluated in the baseline HHRA. Additional details on current and potential future land use can be found in Section 3.1.2 of the baseline HHRA (EPA, 2014).

The following is a brief summary of the exposure pathways that were found to present a significant risk (Incremental Lifetime Cancer Risk [ILCR] greater than 10^{-4} or a Hazard Index [HI] > 1) at the SWP assuming a reasonable maximum exposure scenario. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario, can be found in Section 3.3.1 and on Tables 3-4.1 through 3-4.10 in Section 3 of the baseline HHRA (EPA, 2014).

No current exposure pathways were found to present a significant risk at the SWP.

The following future exposure pathways were found to present a significant risk at the SWP:

- Trespasser (older child) with exposure to Murphy Wetland sediment (by ingestion and dermal contact);[7]

- Recreational user (adult and young child) with exposure to surface and/or subsurface soil (by ingestion and dermal contact) at the Whitney Property and Murphy Property;[8]

- Recreational user (adult and young child) with exposure to Murphy Wetland sediment (by ingestion and dermal contact);[9]

- Construction worker with exposure to subsurface soil (by ingestion, inhalation of particulates, and dermal contact) and/or shallow groundwater (by ingestion and dermal contact) at the Whitney Property and Murphy Property;[10]

- Resident (adult and young child) with exposure to SWP-wide groundwater (by ingestion, inhalation, and dermal contact) used as tap water.[11]

In addition, the vapor intrusion pathway is considered to be potentially complete under future land use conditions if occupied buildings are constructed within 100 feet of overburden soil where VOCs have been detected (at any concentration), and within 100 feet of overburden groundwater in which VOCs have been detected at concentrations greater than vapor intrusion screening levels (VISLs).

The baseline HHRA did not include an evaluation of future residential use of the SWP. However, a screening-level risk evaluation for residential soil exposures at the SWP has been

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[7] For future older child trespasser (12-18 years of age) sediment exposures, an exposure frequency of 52 days/year was used, along with an exposure duration of 6 years. An ingestion rate of 100 mg/day was used. Dermal contact was assumed with 4,500 cm^2 of surface area and an adherence factor of 0.2 mg/cm^2-event. A body weight of 57 kg was used, along with a fraction ingested term of 0.5 which assumes half of the daily sediment ingestion exposure occurs at the SWP.

[8] For future recreational user soil exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Body weights of 70 kg and 15 kg were used for the adult and young child, respectively. Dermal contact was assumed with 5,700 cm^2 of surface area for the adult and 2,800 cm^2 for the young child, with adherence factors of 0.07 and 0.2 mg/cm^2-event for the adult and child, respectively. An exposure frequency of 78 days/year was used.

[9] For future recreational user sediment exposures, an exposure frequency of 78 days/year was used, along with exposure durations of 24 years and 6 years, respectively, for an adult and young child. Ingestion rates of 100 mg/day and 200 mg/day were used for the adult and child, respectively. Body weights of 70 kg and 15 kg were used for the adult and young child, respectively. Dermal contact was assumed with 5,700 cm^2 of surface area for the adult and 2,800 cm^2 for the young child, with adherence factors of 0.07 and 0.2 mg/cm^2-event for the adult and child, respectively. A fraction ingested term of 0.5 was used which assumes half of the daily sediment ingestion exposure occurs at the SWP.

[10] For future construction worker soil and groundwater exposures, an exposure frequency of 125 days/year was used, along with an exposure duration of 1 year. A body weight of 70 kg was used. A soil ingestion rate of 330 mg/day was used. Dermal contact with soil was assumed with 3,300 cm^2 of surface area and an adherence factor of 0.3 mg/cm^2-event. Fugitive dust exposures were assumed to occur 8 hours/day for 125 days/year. Ingestion of groundwater was assumed at a rate of 0.05 liters/day. Dermal contact with groundwater was assumed with 3,300 cm^2 of surface area.

[11] For future residential exposures to SWP-wide groundwater, drinking water ingestion rates of 2 L/day and 1 L/day for the adult and young child, respectively, were assumed. An exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. Dermal contact was assumed with 18,000 cm^2 of surface area for the adult, and 6,600 cm^2 for the young child. Showers/baths were assumed to occur 350 days/year for 0.58 hr/day for the adult and 1 hr/day for the young child. Inhalation during showers/baths evaluated using the Andelman model with a volatilization factor of 0.5 L/m^3.

performed and is included in Appendix C of the 2016 FS (as updated in the 2017 FS Report Addendum – Technical Memorandum) for surface and subsurface soil at the Whitney Property, Murphy Property and the industrial portion of the Aberjona Property. This screening-level risk evaluation estimated future residential risks to be significant, indicating the need for Institutional Controls preventing future residential use of these industrial parcels. No risk evaluation was performed for the Existing Aberjona Residence because no industrial operations are known to have been performed on the residential portion of the property, the residential area is separated from the industrial parcel by fencing, asphalt pavement, and a solid wall, and soil samples collected from the residential portion of the property display similar concentrations to those collected from locations known to be unimpacted by SWP operations. In addition, the soil cleanup standards will not be protective of future daycare child and school-age child who would be exposed more frequently than a recreational child, and Institutional Controls will be necessary to restrict future daycare and school use.

Note that the baseline HHRA was completed in early 2014. After the completion of the baseline HHRA, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates (located online at http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm; items # 22 and #23 of this web link). Applying these updated standard default exposure factors to the risk assessment would possibly result in a slight decrease of the risk estimates; however, it would not change the previous conclusions regarding unacceptable risks at the SWP. These updated standard default exposure factors have been utilized during development of risk-based cleanup levels (see Section L of this ROD).

Section 3: Toxicity Assessment

Carcinogenic Effects

The potential for exposure to a chemical to result in a carcinogenic effect is generally described by two factors: a statement reflecting the degree of confidence that the compound causes cancer in humans and a potency estimate, indicating how potent the chemical may be at causing cancer, with the general assumption that every exposure has some probability of resulting in cancer. The descriptor reflecting the degree of confidence that the compound causes cancer in humans may be either an alpha-numeric value or a narrative. Both are closely tied to the nature and extent of information available from human and animal studies. The cancer potency estimate is a quantitative measure of a compound's ability to cause cancer, and is generally expressed as either a cancer potency factor or an inhalation unit risk value. Cancer potency estimates and unit risk values are toxicity estimates developed by EPA based on epidemiological and/or animal studies, and they reflect a conservative "upper bound" of the potency of the carcinogenic compound. That is, the true potency is unlikely to be greater than the potency described by EPA. **Table G-5** presents these cancer toxicity values and cancer classifications for the COCs at the SWP.

In some cases, however, EPA may conclude that it is not appropriate to generate a cancer potency estimate or unit risk value given the mode of action of the known or suspect carcinogen. Currently, EPA's default procedure for characterizing cancer risk for compounds which may exhibit a threshold for carcinogenic effects, mirrors the process used to describe the potential for adverse non-cancer effects described in the section which follows. A summary of the cancer toxicity data relevant to the COCs at the SWP is presented in **Table G-5**. EPA's Cancer Guidelines and Supplemental Guidance (March 2005) have been used as the basis for analysis of carcinogenicity risk assessment.

In January 2017, EPA revised toxicity values for benzo(a)pyrene. As discussed in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum, use of the revised toxicity values for benzo(a)pyrene and in association with Relative Potency Factors for the other carcinogenic PAHs, resulted in carcinogenic PAHs no longer being selected as COCs for soil or groundwater, except for benzo(a)pyrene which was retained as a groundwater COC.

<u>Non-Carcinogenic Effects and Non-Linear Carcinogenic Effects</u>

For addressing non-carcinogenic effects and effects of carcinogenic compounds which exhibit a threshold, it is EPA's policy to assume that a safe exposure level exists, which is described by the reference dose (RfD) or reference concentration (RfC). RfDs and RfCs have been developed by EPA as estimates of a daily exposure that is likely to be without an appreciable risk of an adverse health effect when exposure occurs over the duration of a lifetime. RfDs and RfCs are derived from epidemiological and/or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The RfDs and RfCs relevant to the SWP are presented in **Table G-6**.

The toxicity values presented in **Tables G-5** and **G-6** are those used in the baseline HHRA, except for compounds where a toxicity update occurred since the baseline HHRA was completed. The results presented in the following section (Risk Characterization) are based on the current toxicity values as presented in Appendix C of the 2016 FS and Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum. Appendix C of the 2016 FS and Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum provide a discussion of the changes to toxicity values since the baseline HHRA was completed. The current toxicity values have also been used during development of risk-based cleanup levels (see Section L of this ROD).

Changes in toxicity values are associated with the RfC for trans-1,2-dichloroethene, and with the RfD value for the C5-C8 aliphatic petroleum hydrocarbon fraction. In May 2014, EPA removed the RfC for trans-1,2-dichloroethene from the PPRTV database. Based on this change, this compound is no longer included as a COC for groundwater due to risk, but is retained as a COC because its maximum detected concentration exceeds an ARAR. The baseline HHRA used the hexane RfD provided in the Health Effects Assessment Summary Tables (HEAST) for evaluating the non-cancer risk of the C5-C8 aliphatic fraction. This RfD has been superseded by the Integrated Risk Information System (IRIS) evaluation for hexane which no longer endorses the use of this RfD value. Instead, the Provisional Peer-Reviewed Toxicity Value (PPRTV) document "Provisional Peer-Reviewed Toxicity Values for Complex Mixtures of Aliphatic and Aromatic Hydrocarbons" recommends use of the PPRTV subchronic RfD for hexane as a chronic RfD for the C5-C8 aliphatic fraction. This RfD was used in the development of cleanup levels for this fraction. In addition, in June 2015, EPA classified aldrin, benzo(a)anthracene, chlordane, 4,4'-DDE, 1,4-dioxane, heptachlor, heptachlor epoxide, PCBs, and dioxin-like PCBs as volatile (as defined in the Regional Screening Levels June 2015 update found at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm). Because these compounds with the exclusion of 4,4'-DDE, are already COCs for groundwater, these changes do not impact the conclusions of the risk assessment presented below. Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum identifies 4,4'-DDE as a groundwater COPC and COC based on this change. Inhalation toxicity values for these compounds have now been used for development of risk-based cleanup levels (see Section L of this ROD) and have, therefore, been included in **Tables G-5** and **G-6**.

Section 4: Risk Characterization

The risk characterization combines the exposure estimate with the toxicity information to estimate the probability or potential that adverse health effects may occur if no action were to be taken at a site. A separate characterization is generated depending on the nature of the adverse effect. Cancer risks are generally expressed as a probability whereas the potential for adverse non-cancer effects (and carcinogenic effects resulting from non-linear [i.e., exhibiting a threshold of toxicity] mode of action [MOA] compounds) are described in terms what is thought to be a safe exposure level.

For exposure to most known or potentially carcinogenic substances, EPA believes that as the exposure increases, the cancer risk increases. In characterizing risk to these types of carcinogenic compounds, a chemical- specific exposure level is generally multiplied with the cancer potency factor or inhalation unit risk to estimate incremental lifetime cancer risk as a result of exposure to site contaminants. To the extent that EPA has deemed that data are sufficient to apply the provisions of the 2005 Children's Supplemental Cancer Risk Guidelines, special consideration of the increased susceptibility to carcinogenic effects that children may have, was included in the risk characterization. The 2005 Children's Supplemental Cancer Guidelines were used to describe any such heightened susceptibility among potentially exposed children. Typically, the resulting cancer risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} or 1E-06 for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration.

All risks estimated represent an incremental risk of cancer from exposures to contamination originating from the SWP. These are risks above and beyond that which we face from other causes such as from cigarettes or ultra-violet radiation from the sun. The chance of an individual developing cancer from all other (unrelated to the SWP) causes has been estimated to be as high as one in three. EPA generally views site related cancer risks in excess of 10^{-4} as unacceptable. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse non-carcinogenic effects (and carcinogenic effects resulting from non-linear MOA compounds), a hazard quotient (HQ) is calculated by expressing the exposure (or the exposure concentration in the case of air exposures) as a ratio of the reference value (RfD or RfC). A HQ $\leq$ 1 indicates that a receptor's exposure to a single contaminant is less than the safe value and that adverse effects are unlikely. Conversely, a HQ > 1 indicates that adverse effects as a result of exposure to the contaminant are possible. To account for additive effects resulting from exposure to more than one compound, a Hazard Index (HI) is generated by adding the HQs for all chemicals of concern that have the same or a similar mechanism or mode of action. As a conservative measure and a common practice, HQs are often added for all compounds of concern that affect the same organ or system (i.e., liver, nervous system) since the mechanism or mode of action is not always known. A HI < 1 indicates that adverse effects are unlikely whereas a HI > 1 indicates adverse effects are possible. Generally, EPA views HI values based on site-related exposure in excess of unity as unacceptable. It should be noted that the magnitude of the HQ or HI is not proportional to the likelihood that an adverse effect will be observed.

As presented in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum, the Integrated Exposure and Uptake Biokinetic (IEUBK) and Adult Lead modeling performed in the baseline risk assessment were revised using updated model parameters recommended by EPA and a target blood lead level of 5 ug/dl. The outcome of the modeling for the future recreational scenario for surface and subsurface soil at the properties and wetland sediment/soil at the Murphy Wetland continues to be consistent with the conclusions of the baseline risk assessment, identifying only lead in wetland sediment/soil as a COC (see discussion below for Future Recreational User – Wetland Sediment/Soil). Likewise, for current/future commercial use of the properties, the revised modeling did not identify lead as a surface or subsurface soil COC, consistent with the conclusions of the baseline risk assessment. Lead is a COC in groundwater, as discussed below in the Future Resident - Groundwater Section.

The following is a summary of the media and exposure pathways that were found to present a significant risk exceeding EPA's cancer risk range and non-cancer threshold at the SWP. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Section 3-5.2 and Tables 3-7, 3-9 and 3-10 of the baseline HHRA (EPA, 2014) for a more comprehensive risk summary of all exposure pathways evaluated for all COPCs, and for estimates of central tendency risk.

Future Recreational User – Soil

Tables G-7 and **G-8** depict the carcinogenic and non-carcinogenic risk summaries for the COCs in soil evaluated to reflect potential future recreational user ingestion and dermal exposure corresponding to the RME scenario. For the future young child and adult recreational user, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1 at the Whitney Property and Murphy Property in both surface and subsurface soil. The exceedances are primarily due to chlorinated VOCs, PAHs, pesticides, PCBs, arsenic, hexavalent chromium, and/or thallium in soil at:

- Whitney Property (surface soil) - primarily due to PCBs;
- Whitney Property (subsurface soil) - primarily due to vinyl chloride, TCE, bis(2-ethylhexyl)phthalate, PCBs, pesticides, arsenic, and hexavalent chromium; and
- Murphy Property (surface and subsurface soil) - primarily due to thallium.

Construction Worker – Soil and Shallow Groundwater

Table G-9 depicts the non-carcinogenic risk summary for the COCs in soil and groundwater evaluated to reflect potential future construction worker ingestion, dermal, and inhalation exposure corresponding to the RME scenario. For the future adult construction worker, non-carcinogenic risks exceeded the EPA target organ HI of 1 at the Whitney Property and Murphy Property in subsurface soil and/or shallow groundwater. The exceedances are primarily due to PCBs in soil and chlorinated VOCs in shallow groundwater at:

- Whitney Property (subsurface soil) - primarily due to PCBs;
- Whitney Property (shallow groundwater) - primarily due to cis-1,2-DCE, PCE and TCE; and
- Murphy Property (shallow groundwater) - primarily due to cis-1,2-DCE.

Future Trespasser – Wetland Sediment/Soil

Table G-10 depicts the non-carcinogenic risk summary for the COCs in wetland sediment/soil evaluated to reflect potential future trespasser ingestion and dermal exposure at the Murphy Wetland corresponding to the RME scenario. For the future older child/adolescent trespasser, non-carcinogenic risks exceeded the EPA target organ HI of 1. The exceedance is primarily due to PCBs in wetland sediment/soil.

Future Recreational User – Wetland Sediment/Soil

Table G-11 depicts the non-carcinogenic risk summary for the COCs in wetland sediment/soil evaluated to reflect potential future recreational user ingestion and dermal exposure at the

Murphy Wetland corresponding to the RME scenario. For the future young child and adult recreational user, non-carcinogenic risks exceeded the EPA target organ HI of 1. The exceedance is primarily due to PCBs and C11-C22 aromatic petroleum compounds in wetland sediment/soil.

The IEUBK Model was used to evaluate the potential hazards resulting from exposure to lead for young children less than 7 years of age as the most sensitive receptor group. The average weekly time-weighted wetland sediment/soil lead concentration was used as the wetland sediment/soil concentration in the model, along with model assumptions presented in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum, including a target blood lead level of 5 ug/dl. The outcome of the modeling identified lead is a COC in wetland sediment/soil at the Murphy Wetland, consistent with the conclusions of the baseline HHRA.

Future Resident - Groundwater

Tables G-12 and **G-13** depict the carcinogenic and non-carcinogenic risk summaries for the COCs in groundwater evaluated to reflect potential future residential potable water exposure corresponding to the RME scenario (under the assumption that groundwater associated with the SWP is used as a source of potable water in the future). For the future resident using untreated groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk of 10^{-4} and/or a target organ HI of 1 for groundwater. The exceedances were due primarily to the presence of VOCs, PAHs, PCBs, pesticides, petroleum hydrocarbon fractions, arsenic, cobalt, iron, and manganese in SWP-wide groundwater. Though not listed on Tables G-12 and G-13, lead was identified as a SWP-wide groundwater COC in the baseline HHRA because lead concentrations in groundwater exceed ARARs. The VOCs trans-1,2-dichloroethene, 1,1,1-trichloroethane and 1,1-dichloroethene are also SWP-wide groundwater COCs because their maximum detected concentrations exceed ARARs, even though the baseline HHRA did not identify them as primary risk contributors. In addition, the pesticide 4,4'-DDE is now identified as a groundwater COC based on its recent identification as a volatile compound, and carcinogenic PAHs, except for benzo(a)pyrene, are no longer identified as groundwater COCs (see above discussion and Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum).

Section 5: Uncertainties

The baseline HHRA identified that elevated sample quantitation limits (SQLs) were reported for some constituent analytical results, which may mask the presence of that constituent in the affected samples. This may result in an underestimation of risk. One chemical for which this may have occurred is 1,4-dioxane. All results for this chemical were non-detect in soil, therefore, it was not quantitatively evaluated in the risk assessment. Soil SQLs for this chemical range from 0.041 mg/kg to 460 mg/kg, compared to a residential soil Regional Screening Level (RSL) of 5.3 mg/kg and a commercial soil RSL of 24 mg/kg. Therefore, excluding this chemical from the quantitative assessment could have resulted in an underestimation of the risk, if 1,4-dioxane was present at concentrations greater than the RSL. However, all locations with elevated SQLs were located on the Whitney Property where risks calculated for soils were above EPA risk management criteria.

The baseline HHRA also identified that in groundwater, a number of 2011 non-detect results for 1,4-dioxane were rejected. The maximum detected concentration (78 μg/L) was used as the EPC for the RME scenario, potentially resulting in an underestimation of risk if the presence of higher concentrations of 1,4-dioxane in groundwater was masked by the rejected data. However, use of the maximum detected concentration results in the conclusion that 1,4-dioxane is a risk contributor in groundwater. Therefore, the conclusions of the risk assessment have not been affected by the rejected groundwater data and elevated SQLs for 1,4-dioxane, though the potential extent of 1,4-dioxane in groundwater cannot be accurately determined based on the available data.

Carcinogenic and non-carcinogenic risks for each receptor were not summed across all media. For example, the risks to the recreational and trespasser receptors from surface water and wetland sediment/soil were not summed with those from soil ingestion and dermal contact for the three properties. This may have resulted in an underestimation of cumulative risk for these receptors. However, summing the risks for all pathways in this circumstance would not have a significant impact on the overall calculated risks because the risk associated with exposure to wetland sediment/soil is significantly greater than for exposure to soil. In addition, risks from a given medium were not summed across exposure areas (e.g., soil media across Aberjona Property, Whitney Property and Murphy Property). That is, for any given receptor, risks were calculated assuming that exposure occurs at only one property. This assumption is uncertain since a given recreational receptor may spend a portion of his/her time in one exposure area and a portion in another. Risks to such an individual would be intermediate between the risks to individuals exposed solely within each exposure area.

2. Ecological Risk Assessment

An Ecological Risk Assessment (ERA) was prepared for the SWP to evaluate the likelihood and magnitude of potential ecological risks associated with the Murphy Wetland at the SWP (TRC, 2014). The technical guidance used to perform the ERA came primarily from "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments EPA/540/R-97/006" (EPA, 1997).

The ERA evaluated data collected during the 1995, 1997, 2003 and 2004 field programs to estimate the risk of ecological harm associated with SWP-related Chemicals of Potential Ecological Concern (COPECs) in wetland surface soil as well as surface water and wetland sediment associated with the SWP's seasonally ponded surface water body.

Section 1: Identification of Chemicals of Potential Ecological Concern (COPECs)

The ERA prepared for the SWP identified the COPECs which were evaluated in the ERA based on pooled datasets from 1995 and 1996 (Clean Harbors, 1998), 2003 (RETEC, 2003) and 2004 split samples (TRC, 2004).

The following ecologically-relevant Murphy Wetland areas of interest (AOIs) were identified:

- Seasonally Ponded Area
- Forested/Shrub Wetland

In order to select COPECs, maximum detected chemical concentrations were compared to medium-specific screening benchmarks for surface water, wetland sediment, and wetland soil. An analyte was retained as a COPEC if (a) the maximum concentration equaled or exceeded the screening benchmark, or (b) it did not have a screening benchmark. A chemical was eliminated as a COPEC if it's maximum detected concentration was less than the screening benchmark.

Benchmark comparisons in the ERA characterized possible risk to invertebrates at the Seasonally Ponded Area in surface water due to aluminum, cyanide, iron, and manganese (**Table G-14**) and in wetland sediment due to five Volatile Organic Compounds (VOCs), 21 Semi-Volatile Organic Compounds (SVOCs), PCB congeners, PCB Aroclors, five pesticides, and 20 inorganics (**Table G-15**). In addition, the preliminary screening of COPECs in the ERA selected COPECs in wetland surface soils sampled from the forested/shrub wetland. PCB Aroclors and 13 inorganics were initially retained as wetland surface soil COPECs (**Table G-16**).

Section 2: Exposure Assessment

The 13.3 acre SWP is located adjacent to Salem Street in the City of Woburn, Massachusetts and encompasses three distinct properties consisting of the Aberjona, Whitney and Murphy Properties. A small forested/scrub-shrub wetland area and an intermittent stream are present within the northern portion of the Whitney Property while a seasonally ponded area is located immediately adjacent on the Murphy Property. This wetland is referred to as the Murphy Wetland. The seasonally ponded cover type extends over an area of approximately 0.8 acres while the forested/scrub-shrub wetland totals approximately 0.9 acres in extent. With the exception of the Murphy Wetland that is present on both the Murphy and Whitney Properties, no other significant habitat exists on the SWP. The remaining portions of these parcels and the Aberjona Property consist of occupied buildings, scrapped automobiles, wood/metal debris, and pavement/barren dirt areas. These areas were not evaluated in the ERA as they offer little viable habitat to ecological receptors.

The ERA was completed to estimate the risk of ecological harm associated with SWP-related COPECs in wetland surface soil as well as surface water and wetland sediment. Ecological risks were evaluated if the growth, survival, or reproduction of aquatic invertebrates, wetland birds, and wetland mammals could be significantly affected by SWP-related contamination in aquatic habitats (Seasonally Ponded Area) and/or terrestrial habitats (Forested/Shrub Wetland).

Complete exposure pathways identified in the ERA included: the uptake of COPECs from wetland sediment, surface water, and wetland soil through roots (vegetation); ingestion of COPECs bound to wetland soil (terrestrial mammals); ingestion of COPECs bound to wetland sediment (benthic invertebrates, semi-aquatic wetland birds and mammals); ingestion of dissolved and particulate COPECs in surface water (aquatic invertebrates, semi-aquatic wetland birds and mammals); ingestion of COPECs through consumption of contaminated plants (herbivores and omnivores); and ingestion of COPECs through consumption of contaminated invertebrate prey (insectivores).

Table G-17 summarizes the receptor groups and assessment/measurement endpoints evaluated in the ERA.

The Massachusetts Natural Heritage and Endangered Species Program (MANHESP; 2009)[12] was consulted regarding the presence of state-listed rare, threatened, or endangered species and priority habitat at and in the vicinity of the SWP during the preparation of the ERA. The MANHESP indicated that there are no state-listed species known to occur in the project area (MANHESP, 2009).

Exposure Point Concentrations (EPCs) for COPECs in surface water, wetland sediment, and prey were calculated in terms of maximum exposures and Central Tendency Exposures (CTEs). CTE is a reasonable representation of the likely concentration to which a population of receptors would be exposed. CTE EPCs were calculated as the arithmetic mean. Maximum EPCs were represented by the maximum concentrations of each COPEC.

Exposure of terrestrial and wetland wildlife (i.e., birds and mammals) to COPECs was estimated using food chain models. Biological tissue concentrations within plants and representative prey species, such as aquatic and terrestrial invertebrates were estimated to provide tissue data to be incorporated into the food chain models. Surface water, wetland sediment, wetland soil, and tissue EPCs were entered into the food chain model to calculate an estimated daily intake (EDI) to which the receptor may be exposed. EPCs for prey items were estimated using biota-sediment accumulation factors (BSAFs) or bioaccumulation factors (BAFs) derived from the literature.

Food chain modeling was used to calculate COPEC-specific EDIs for the herbivorous, insectivorous and omnivorous wildlife receptors foraging in the aquatic and terrestrial habitats at the SWP. The food chain models quantified the EDIs by calculating the intake of COPECs via food ingestion, surface water drinking, and incidental wetland soil or wetland sediment ingestion, which were considered the primary exposure routes.

Section 3: Ecological Effects Assessment

[12] MANHESP, 2009. Massachusetts Natural Heritage and Endangered Species Program, Letter dated June 22, 2009 from Thomas W. French, PhD, Assistant Director, Division of Fisheries and Wildlife, Field Headquarters, Westborough, MA to Antony Rodolakis, MACTEC.

In aquatic habitats, effects assessments included comparison of surface water concentrations to published chronic surface water benchmarks and to a reference wetland, and comparison of concentrations of COPECs in wetland sediment to published sediment benchmarks and from a reference wetland sediment.

Food chain models were used to compare the EDIs for herbivorous semi-aquatic mammals (muskrat), omnivorous waterfowl (mallard), and insectivorous small mammals (short-tailed shrew), based on exposure in the Seasonally Ponded Area, to published wildlife toxicity reference values (TRVs) and to reference wetland conditions. For the terrestrial habitat provided by the forested/shrub wetland, a food chain model for the insectivorous short-tailed shrew was used to compare an EDI to a mammalian TRV.

Section 4: Ecological Risk Characterization

The following risk characterization includes a brief summary of the environmental risks associated with the relevant media, the basis of these risks, and how these risks were determined in the ERA. The ERA compared SWP data (exposure point concentrations) to ecotoxicological benchmark and reference wetland values as well as food chain modeling. The conclusions of the ERA are summarized below for each of the exposure areas where it was determined that ecological risk may be present.

Hazard Quotients (HQs) were calculated to determine risk to (a) aquatic receptors directly exposed to surface water and wetland sediment, and (b) wildlife species exposed to contaminated media, plus prey items. An HQ shows how much the concentration of a COPEC exceeds its benchmark or TRV. HQs were calculated as follows:

HQ = EPC / benchmark or TRV

The EPC can be based on either a maximum exposure or CTE scenario.

The risk characterization also includes an evaluation of reference wetland concentrations to the overall SWP risks. A summary of the risk conclusions within the Seasonally Ponded Area and Forested/Shrub Wetland is presented in **Table G-18**.

Seasonally Ponded Area

The aquatic invertebrate endpoints suggest that there may be impacts from COPECs on invertebrate communities inhabiting the seasonally ponded area. The strength of the evidence was based entirely on exceedances of surface water and sediment-effects benchmarks. Risk from detected COPECs to the aquatic macroinvertebrate community from the detected COPECs within the surface waters of the Seasonally Ponded Area were initially identified using total recoverable mean concentrations. Though this evaluation, aluminum, barium, cyanide, iron and manganese exceed their respective chronic benchmarks. However, none of the five COPECs exceeds its respective acute benchmark and mean concentrations of aluminum, iron and manganese are greater in the reference wetland surface water. Barium was not detected above an alternative USEPA-reported effect level. Cyanide was detected slightly above its chronic benchmark at two of the three surface water samples collected from the Seasonally Ponded Area.

The potential for ecological risk to the benthic invertebrate community in the Seasonally Ponded Area was identified by comparing concentrations of the COPECs in wetland sediment with benchmarks protective of benthic biota and sediment concentrations of these COPECs detected in the reference wetlands. PCB Aroclors, chromium, lead and zinc were identified as the major risk drivers as the mean concentrations of these COPECs exceed sediment benchmarks associated with severe or probable effect concentrations. Food chain models characterized risk to the mallard duck at the Seasonally Ponded Area as unlikely. Food chain models suggest that risk to muskrat is possible from mean PCB and chromium concentrations in the wetland sediment. Food chain models also suggest that in the wetland sediment of the Seasonally Ponded Area, risk to shrews is also possible from PCBs and chromium.

The refined list of Contaminants of Ecological Concern (COECs) in the Seasonally Ponded Area, along with recommended protective levels and the basis for each level, are presented in **Table G-19.**

Forested/Shrub Wetland

Based on the results of the ERA, it was concluded that risks to shrews inhabiting the Forested/Shrub Wetland are likely due to mean concentrations of PCBs and chromium. The refined list of COECs in the Forested/Shrub Wetland, along with recommended protective levels and the basis for each level, are presented in **Table G-19.**

Section 5: Uncertainties

There is uncertainty associated with estimates of risk in any ERA because the risk estimates are based on a number of assumptions regarding exposure and toxicity. More specifically, there is inherent variability and uncertainty associated with the data collected to characterize exposure concentrations and assumptions about the bioavailability of the selected COPECs. There are also assumptions and limitations inherent in food chain modeling, including selection of exposure and modeling parameters (e.g., dietary intake, body weight, and age), uptake factors, and toxicological data (e.g., TRVs).

The food chain models assumed that 100% of the metals ingested are absorbed. SWP-specific prey tissue data were unavailable for benthic macroinvertebrates and plants at the Seasonally Ponded Area and the Forested/Shrub Wetland. SWP-specific tissue data would reduce uncertainty and result in greater confidence in the risk estimation because they are direct measures of potential exposures to receptors.

Overall, the conservative nature of the food chain models likely overestimate risk associated wetland sediment COPECs.

Toxicity values for indicator species and communities were based on literature values which represents a major source of uncertainty in the ERA. The sensitivity of receptors at the SWP may be different than the sensitivity of species used in tests reported in the literature. The results of different studies often varied several orders of magnitude, based on using various forms of the COPEC, different species, and different endpoints. One of the largest sources of uncertainty in all of these TRV values is the form of the chemical used to determine the laboratory exposure. The HQ approach uses the assumption that the absorption of the chemical from the diet will be the same as the absorption of the chemical in the form used in the laboratory. Often this assumption is very conservative, because laboratory studies use readily-dissolved forms of metals, which are more readily absorbed than metals ingested via consumption of contaminated sediment and/or plants.

3. Basis for Response Action

The baseline human health and ecological risk assessments determined that future recreational users, construction workers, residents or ecological receptors potentially exposed to COCs in soil, wetland sediment/soil, or groundwater via direct contact, ingestion, or inhalation may present an unacceptable human health or ecological risk. Therefore, the current and potential future releases of hazardous substances from the SWP, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Remedial actions are focused on the following media: surface and subsurface soils at the Aberjona, Whitney and Murphy Properties, wetland sediments/soils at the Murphy Wetland, and SWP-wide groundwater

Leaching of volatile and petroleum-related (C5-C8 aliphatic, C9-C12 aliphatic, C9-C18 aliphatic, C9-C10 aromatic, and C11-C22 aromatic) contaminants from soil to groundwater was evaluated in the 2016 FS Report, where leaching-based Preliminary Remediation Goals (PRGs) for soil above the water table are exceeded. Soils above the water table in various areas of the SWP, including the Murphy, Whitney and Aberjona Properties, exceeded the leaching-based PRGs. Details of the leaching evaluation can be found in the 2016 FS Report and 2017 FS Report Addendum – Technical Memorandum.

Although the risk assessment did not evaluate the risk associated with NAPL and no risk-based PRGs have been developed for NAPL, NAPL serves as a continuing source of contamination to groundwater as contaminants leach/dissolve from the NAPL and migrate to groundwater. Therefore, the remedy addresses NAPL.

H. REMEDIATION OBJECTIVES

Remedial Action Objectives (RAOs) are medium-specific goals that define the objective of remedial actions to protect human health and the environment. RAOs specify the potential exposure routes and receptors and provide a general description of what the cleanup will accomplish. The RAOs are based on available information and standards, such as ARARs, to-be-considered (TBC) guidance, and site-specific risk-based levels. The COCs are presented in Tables Gs (Appendix B) and the cleanup levels are presented in Tables L1 through L4 (Appendix B). These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health and the environment.

The RAOs for the selected remedy for the SWP are:

Soil:

- Murphy Property:
  1) Prevent direct human contact/ingestion/inhalation with contaminated soils that exceed ARAR and risk-based standards.
  2) Prevent soil leaching and resulting contaminant migration to groundwater in excess of leaching-based standards.
  3) Prevent migration of contaminated soil to wetlands and adjoining properties.
- Aberjona Property (excluding Existing Aberjona Residence):
  1) Prevent direct human contact/ingestion/inhalation with contaminated soils that exceed risk-based standards.
  2) Prevent soil leaching and resulting contaminant migration to groundwater in excess of leaching-based standards.
  3) Prevent migration of contaminated soil to wetlands and adjoining properties.
- Whitney Property:
  1) Prevent direct human contact/ingestion/inhalation with contaminated soils that exceed ARAR and risk-based standards.
  2) Prevent soil leaching and resulting contaminant migration to groundwater in excess of leaching-based standards.
  3) Prevent migration of contaminated soil to wetlands and adjoining properties.

Groundwater:

1) Prevent human exposure to groundwater containing concentrations of contaminants in excess of the ARAR and risk-based standards.
2) Prevent or minimize migration of contaminants in groundwater.

3) Restore groundwater to its beneficial use by attaining ARAR and risk-based standards.

NAPL:

1) Remove and/or contain NAPL and residual NAPL to the extent practicable, as a source control measure.
2) Prevent human exposure to NAPL containing concentrations of contaminants that contribute to exceedances of groundwater and/or soil ARAR and risk-based standards.
3) Prevent NAPL migration, leaching to groundwater, and discharge to wetlands.

Wetland Sediment/Soil - Murphy Wetland:

1) Prevent direct human contact with contaminated wetland sediments/soils that exceed ARAR and risk-based standards.
2) Prevent exposure of ecological receptors to contaminants in wetland sediments/soils that present an unacceptable ecological risk.

Soil Gas:

1) Prevent human exposure to volatile compounds that would pose an inhalation risk.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: 1) a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; 2) a requirement that EPA select a remedial action that is cost-effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 3) a preference for remedies in which treatment that permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

B. Technology and Alternative Development and Screening

CERCLA and the NCP- set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the SWP.

With respect to source control, the RI/FS and 2017 FS Report Addendum – Technical Memorandum developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long term management. This range also included alternatives that treat the principal threats posed by the SWP, but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternative(s) that involve little or no treatment but provide protection through engineering or Institutional Controls; and a no action alternative.

With respect to ground water response action, the RI/FS and the 2017 FS Report Addendum – Technical Memorandum developed a number of remedial alternatives that attain site specific remediation levels within different timeframes using different technologies; and a no action alternative.

As discussed in Section 3 of the FS Report, soil, SWP-wide groundwater, NAPL and wetland sediment/soil treatment technology options were identified, assessed and screened based on implementability, effectiveness, and cost. These technologies were combined into source control (SC) and management of migration (MM) alternatives. The 2017 FS Report Addendum – Technical Memorandum and Section 4 of the FS presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in the 2017 FS Report Addendum – Technical Memorandum and in Sections 5 and 6 of the FS.

In summary, of the 47 source control and management of migration remedial technologies screened in Section 3 of the FS for all impacted media including soil, SWP-wide groundwater, NAPL and wetland sediment/soil, 23 were retained as possible options for the cleanup of the SWP. From this initial screening, remedial options were combined, and 26 source control and management of migration alternatives were selected for detailed analysis. Although the alternatives are media-specific, the media and alternatives are interrelated such that one alternative for a particular medium may impact the remedial alternative options for other media. For example, since soil impacts and NAPL (e.g., Northern Whitney Soil Area) result in the migration of COCs to groundwater, any groundwater alternative would be dependent upon the actions taken to eliminate principal threat wastes associated with soil and NAPL, otherwise the efficiency, effectiveness and timeframe for cleanup of the groundwater remedy could be compromised.

J. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each source control and management of migration alternative evaluated. Refer to Section K of this ROD for a breakdown of costs (including capital and O&M), as well as discussion on the time to construct and meet RAOs, for each alternative.

1. Source Control Alternatives Analyzed

The source control alternatives analyzed for the SWP include:

Soil Alternatives (evaluated individually for the Whitney (SW), Murphy (SM) and Aberjona (SA) Properties)

- SW-1/SM-1/SA-1: No Action
- SW-2/SM-2/SA-2: Capping and Institutional Controls
- SW-3/SM-3/SA-3: Soil Excavation, Off-site Disposal, Capping, and Institutional Controls
- SW-4/SM-4/SA-4: Soil Excavation, Off-site Disposal, Cover and Institutional Controls[13]

NAPL Alternatives

- N-1: No Action
- N-2: NAPL Skimming/Recovery and Institutional Controls
- N-3: Excavation and Off-Site Disposal

Murphy Wetland Sediment/Soil Alternatives

- WTL-1: No Action
- WTL-2: Monitored Natural Recovery and Institutional Controls
- WTL-3: Capping, Wetland Mitigation, Monitoring and Institutional Controls
- WTL-4: Shallow (1 Foot) Excavation and Targeted Deeper (3 Feet) Excavation, Off-Site Disposal, Amended Cap, Wetland Restoration, Monitoring and Institutional Controls
- WTL-5: Deep (3 Feet) Excavation and Off-Site Disposal, Backfill, and Wetland Restoration

Each of the 20 source control alternatives is summarized below. A more complete, detailed presentation of each alternative is found in the 2017 FS Report Addendum – Technical Memorandum and Section 5 of the FS.

Soil Alternatives

13 A cover is not required as part of the remedy for the Aberjona Property (Alternative SA-4).

<u>Whitney Soil Alternatives</u> The Whitney Property soils include significantly contaminated soil at the "Northern Whitney Soil Area" and lesser contaminated soils (which exceeds preliminary remediation goals) on the remainder of the Whitney Property. Both types of soil are addressed by the alternatives under this section, except for the No Action Alternative. "Significantly contaminated soil" is defined as soil with contaminant concentrations 10 times greater that the soil cleanup levels and/or greater than or equal to 50 mg/kg (equivalent to ppm) of PCBs.

With the exception of the No Action (SW-1) alternative, each of the alternatives for Whitney Soil includes a pre-design investigation to further define the horizontal and vertical extent of soil contamination, all appropriate plans and specifications (*e.g.*, air monitoring plan, transportation plan, dust and odor control plan, soil management plan, restoration plan, demolition plan for existing buildings, erosion and sedimentation control plan, trucking plan, and/or health and safety plan), and all necessary preparation and mobilization activities (*e.g.*, removal of trees and other vegetation, removal of large debris, relocation of business equipment and materials, installation of temporary fencing, decontamination facilities, soil stockpile areas, trailer, and/or sanitation facilities).

SW-1: No Action

Under the no action alternative, no additional actions would be taken to address exposure to soils at the Whitney Property. The No Action Alternative does not include active remediation or institutional controls and the current levels of contaminants in soil are assumed to remain unchanged. As required by CERCLA, five-year reviews would still be performed as part of the No Action Alternative. As required by the CERCLA and the NCP, the No Action Alternative serves as a baseline for comparing the effectiveness of other remedial alternatives for soils. Except for the cost of statutorily-required five-year reviews, there is no cost associated with this alternative.

SW-2: Capping and Institutional Controls

Under this alternative, all soils exceeding cleanup levels would be covered with an impermeable cap designed to prevent direct contact with impacted soils, to prevent soil from being carried to the wetland or neighboring properties during rain events via erosion, and/or to prevent soil contaminants from leaching to groundwater. The cap would be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy ARAR requirements (*e.g.*, TSCA); and prevent contaminant leaching to groundwater (*i.e*. meet impermeability requirements). Flood storage loss due to capping would require mitigation nearby within the waterway. Additional mitigation measures may be required to address any additional long- or short-term floodplain impairment within the 500-year floodplain. This alternative also includes long-term monitoring and maintenance of the capped areas as well as Institutional Controls to insure the cap is maintained; prohibit residential, school, and daycare use, and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 12 weeks. The total estimated cost of this alternative is approximately $2.3 million.

SW-3: Soil Excavation and Off-site Disposal for Northern Whitney Soil Area, Capping, and Institutional Controls

Under this alternative, the significantly contaminated soils exceeding cleanup levels (i.e. 10 times greater than the soil cleanup level and/or greater than or equal to PCBs at 50 mg/kg (ppm)) at the Whitney Northern Soil Area (estimated to be approximately 5,400 cubic yards at the Whitney Property) would be excavated and disposed of at an approved off-site facility. Excavated materials will be managed so as to not impair resources within the 500-year floodplain or adjacent wetlands, to the extent practicable. Mitigation measures may be required to address any unavoidable long- or short-term impairment within the 500-year floodplain. Excavated areas would then be backfilled with clean soils and an impermeable cap installed over areas with remaining subsurface soil contamination. The cap will be installed at grade so there will not be any net loss of floodplain storage. The clean backfill material placed in the Northern Whitney Soil Area would include mixing amendments (e.g., ZVI) below the water table to reduce soil and local groundwater concentrations and support groundwater cleanup (*i.e*., in the Northern Whitney Soil Area). Due to the depth of the excavation, shoring would also be installed in the Northern Whitney Soil Area to prevent collapse of the sidewalls and impacts to the wetland/floodplain. Dewatering and appropriate treatment of the extracted groundwater and any water removed from dewatering saturated soils will be required in association with excavations below the groundwater table. The remaining soils exceeding cleanup levels (estimated to be approximately 70,000 square feet) would be covered with an impermeable cap designed to prevent direct contact with impacted soils, to prevent soil from being carried to the wetland or neighboring properties during rain events via erosion or flooding, and/or to prevent soil contaminants from leaching to groundwater (*i.e*., meet impermeability requirements). Shallow excavation would occur in areas subject to capping (outside of the area of significantly contaminated soils) (estimated to be approximately 5,200 cubic yards) to facilitate cap placement without a net loss of floodplain storage. This excavated material (a total of 10,600 cubic yards) would also be transported off-site for disposal. The large building located at the center of the Whitney Property will likely require complete demolition, to be determined post-ROD during Remedial Design. The cap will be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy ARAR requirements (*e.g*., TSCA); to prevent flood storage loss; and prevent contaminant leaching to groundwater (*i.e*. meet impermeability requirements). Existing structures (*e.g.*, concrete foundations and slabs) may be evaluated during the Remedial Design process for potentially satisfying cap requirements. This alternative also includes long-term monitoring and maintenance of the capped areas as well as Institutional Controls to insure the cap is maintained; prohibit residential, school, and daycare use; and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 7 months. The total estimated cost of this alternative is approximately $7.0 million.

SW-4: Soil Excavation, Off-site Disposal, Cover and Institutional Controls

This alternative includes the excavation of the Northern Whitney Soil Area (5,400 cubic yards, consistent with Alternative SW-3) and all soils exceeding cleanup levels above the water table (estimated to be approximately 16,400 cubic yards) and disposal of these excavated materials at an approved off-site disposal facility. Excavated materials (a total of approximately 21,800 cubic yards) will be managed so as to not impair resources within the 500-year floodplain or adjacent wetlands, to the extent practicable. Mitigation measures may be required to address any unavoidable long- or short-term impairment within the 500-year floodplain. Buildings will require complete demolition. Shoring, dewatering and extracted water treatment would be necessary in association with the implementation of this alternative. Excavated areas would then be backfilled with clean soils to serve as a protective cover, and amendments (e.g., ZVI) would be mixed below the water table to reduce soil and local groundwater concentrations and support groundwater cleanup (i.e., in the Northern Whitney Soil Area). This alternative also includes Institutional Controls to manage deeper soils that exceed cleanup levels; prohibit residential, school, and daycare use; and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 6 to 12 months. The total estimated cost of this alternative is approximately $9.8 million.

Murphy Soil Alternatives Except for the No Action Alternative, the alternatives for the Murphy Property address direct contact exposure to thallium in soil and the leaching of VOCs and applicable petroleum fractions from soil to groundwater.

With the exception of the No Action (SM-1) alternative, each of the alternatives for Murphy Soil includes a pre-design investigation to better define the extent of COCs exceeding the soil PRGs, all appropriate plans and specifications (*e.g*., air monitoring plan, transportation plan, dust and odor control plan, soil management plan, restoration plan, demolition plan for existing buildings, erosion and sedimentation control plan, trucking plan, and/or health and safety plan) and all necessary preparation and mobilization activities (*e.g*., removal of trees and other vegetation, removal of large debris, relocation of business equipment and materials, installation of temporary fencing, decontamination facilities, soil stockpile areas, trailer, and/or sanitation facilities).

SM-1: No Action

Under the No Action Alternative, no additional actions would be taken to address exposure to soils at the Whitney Property. The No Action Alternative does not include active remediation or institutional controls and the current levels of contaminants in soil are assumed to remain unchanged. As required by CERCLA, five-year reviews would still be performed as part of the No Action Alternative. As required by CERCLA and the NCP, the No Action Alternative serves as a baseline for comparing the effectiveness of other remedial alternatives for soils. Except for the cost of statutorily-required five-year reviews, there is no cost associated with this alternative.

SM-2: Capping and Institutional Controls

Under this alternative, all soils exceeding cleanup levels would be covered with an impermeable cap designed to prevent direct contact with impacted soils, to prevent soil from being carried to the wetland or neighboring properties during rain events via erosion, and/or to prevent soil contaminants from leaching to groundwater. The cap would be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy ARAR requirements (*e.g.*, TSCA and/or RCRA); and prevent contaminant leaching to groundwater (*i.e*. meet impermeability requirements). Flood storage loss due to capping would require mitigation nearby within the waterway. Additional mitigation measures may be required to address any additional long- or short-term floodplain impairment within the 500-year floodplain. This alternative also includes long-term monitoring and maintenance of the capped areas as well as Institutional Controls to insure the cap is maintained; prohibit residential, school, and daycare use; and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 12 weeks. The total estimated cost of this alternative is approximately $1.8 million.

SM-3: Soil Excavation, Off-Site Disposal, Capping and Institutional Controls

Under this alternative, soils exceeding cleanup levels (estimated to be approximately 93,500 square feet) would be covered with an impermeable cap designed to prevent direct contact with impacted soils, to prevent soil from being carried to the wetland or neighboring properties during rain events via erosion or flooding, and/or to prevent soil contaminants from leaching to groundwater (*i.e*. meet impermeability requirements). Shallow excavation would occur in areas subject to capping (estimated to be approximately 6,900 cubic yards) to facilitate cap placement without a net loss of floodplain storage. This excavated material would be transported off-site for disposal. The cap will be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy ARAR requirements (*e.g*., TSCA and/or RCRA); to prevent flood storage loss; and prevent contaminant leaching to groundwater (*i.e*. meet impermeability requirements). Existing structures (*e.g*., concrete foundations and slabs) may be evaluated during the Remedial Design process for potentially satisfying cap requirements. This alternative also includes long-term monitoring and maintenance of the capped areas as well as Institutional Controls to insure the cap is maintained; prohibit residential, school, and daycare use; and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 12 weeks. The total estimated cost of this alternative is approximately $3.0 million.

SM-4: Soil Excavation, Off-Site Disposal, Cover and Institutional Controls

This alternative includes the excavation of all soils exceeding cleanup levels above the water table (estimated to be approximately 26,500 cubic yards) and disposal of these excavated materials at an approved off-site disposal facility. Excavated materials will be managed so as to not impair resources within the 500-year floodplain or adjacent wetlands, to the extent practicable. Mitigation measures may be required to address any unavoidable long- or short-term impairment within the 500-year floodplain. Buildings will require complete demolition. Shoring, dewatering and extracted water treatment would be necessary in association with the implementation of this alternative. Excavated areas would then be backfilled with clean soils. This alternative also includes Institutional Controls to manage deeper soils that exceed cleanup levels; prohibit residential, school or daycare use; and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 6 to 12 months. The total estimated cost of this alternative is approximately $11.4 million.

Aberjona Soil Alternatives Except for the No Action Alternative, the alternatives for soil at the Aberjona Property address leachability of VOCs and applicable petroleum fractions from soil to groundwater.

With the exception of the No Action (SA-1) alternative, each of the alternatives for Aberjona Soil includes a pre-design investigation to better define the extent of COCs exceeding the soil PRGs, all appropriate plans and specifications (*e.g*., air monitoring plan, transportation plan, dust and odor control plan, soil management plan, restoration plan, demolition plan for existing buildings, erosion and sedimentation control plan, trucking plan, and/or health and safety plan) and all necessary preparation and mobilization activities (*e.g*., removal of trees and other vegetation, removal of large debris, relocation of business equipment and materials, installation of temporary fencing, decontamination facilities, soil stockpile areas, trailer, and/or sanitation facilities).

SA-1: No Action

Under the No Action Alternative, no additional actions would be taken to address exposure to soils at the Whitney Property. The No Action Alternative does not include active remediation or institutional controls and the current levels of contaminants in soil are assumed to remain unchanged. As required by CERCLA, five-year reviews would still be performed as part of the No Action Alternative. As required by CERCLA and the NCP, the No Action Alternative serves as a baseline for comparing the effectiveness of other remedial alternatives for soils. Except for the cost of five-year reviews, there is no cost associated with this alternative.

SA-2: Capping and Institutional Controls

Under this alternative, all soils exceeding cleanup levels would be covered with a cap designed to prevent direct contact with impacted soils, to prevent soil from being carried to the wetland or neighboring properties during rain events via erosion, and/or to prevent soil contaminants from leaching to groundwater. The cap would be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy ARAR requirements (*e.g*., TSCA and/or RCRA); and prevent contaminant leaching to groundwater (*i.e*. meet impermeability requirements). Flood storage loss due to capping would require mitigation nearby within the waterway. Additional mitigation measures may be required to address any additional long- or short-term floodplain impairment within the 500-year floodplain. This alternative also includes long-term monitoring and maintenance of the capped areas as well as Institutional Controls to insure the cap is maintained; prohibit residential, school and daycare use (except on the Existing Aberjona Residence area); and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 4 weeks. The total estimated cost of this alternative is approximately $0.16 million.

SA-3: Soil Excavation, Off-Site Disposal, Capping and Institutional Controls

Under this alternative, soils exceeding cleanup levels (estimated to be approximately 3,600 square feet) would be covered with an impermeable cap designed to prevent direct contact with impacted soils, to prevent soil from being carried to the wetland or neighboring properties during rain events via erosion or flooding, and/or to prevent soil contaminants from leaching to groundwater (*i.e*. meet impermeability requirements). Shallow excavation would occur in areas subject to capping (estimated to be approximately 300 cubic yards) to facilitate cap placement without a net loss of floodplain storage. This excavated material would also be transported off-site for disposal. The cap will be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy ARAR requirements (*e.g*., TSCA and/or RCRA); to prevent flood storage loss; and prevent contaminant leaching to groundwater (*i.e*. meet impermeability requirements). Existing structures (*e.g*. concrete foundations and slabs) may be evaluated during the Remedial Design process for potentially satisfying cap requirements. This alternative also includes long-term monitoring and maintenance of the capped areas as well as Institutional Controls to insure the cap is maintained; prohibit residential, school and daycare use (except on the Existing Aberjona Residence area); and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 12 weeks. The total estimated cost of this alternative is approximately $0.41 million.

SA-4: Soil Excavation, Off-Site Disposal, Cover and Institutional Controls

This alternative includes the excavation of all soils exceeding cleanup levels above the water table (estimated to be approximately 800 cubic yards for Aberjona Property) and disposal of these excavated materials at an approved off-site disposal facility. Excavated materials will be managed so as to not impair resources within the 500-year floodplain or adjacent wetlands, to the extent practicable. Mitigation measures may be required to address any unavoidable long- or short-term impairment within the 500-year floodplain. The commercial building on the Aberjona Property may require complete or partial demolition. Shoring, dewatering and extracted water treatment would be necessary in association with the implementation of this alternative. This alternative also includes Institutional Controls to manage deeper soils that exceed cleanup levels, prohibit residential, school, and daycare use (except on the Existing Aberjona Residence), and guard against the future vapor intrusion pathway. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 6 to 12 months. The total estimated cost of this alternative is approximately $0.63 million.

NAPL Alternatives

N-1: No Action

Alternative N-1 is the No Action Alternative. This alternative provides No Action to address this source of contamination to environmental media, particularly groundwater and soil. As required by CERCLA, five-year reviews would still be performed as part of the No Action Alternative. As required by the CERCLA and the NCP, the No Action Alternative serves as a baseline for comparing the effectiveness of other remedial alternatives to be developed for NAPL. Except for the cost of five-year reviews, there is no cost estimated as part of this alternative.

N-2: NAPL Skimming and Institutional Controls

Alternative N-2 includes automatic skimming of NAPL from monitoring wells within the NAPL areas at the Whitney and Murphy Properties and an excavated recovery trench, NAPL recovery into drums for off-site disposal, and institutional controls. The recovery trench will improve the efficiency of NAPL removal and protect the wetland from continuing impacts by intercepting NAPL before discharge to the wetland occurs. Contaminated soils excavated from the trench will be managed so as to not impair resources within the 500-year floodplain or adjacent wetlands, to the extent practicable. Dewatering and extracted water treatment may be necessary in association trench construction and management of the excavated soil/NAPL. Mitigation measures may be required to address any unavoidable long- or short-term impairment within the 500-year floodplain. In some areas the design of the trench would need to be incorporated into the design for any soil caps called for under the soil component of the remedy. The skimming system would require long-term routine inspection and maintenance throughout implementation of this cleanup approach. This alternative also includes the implementation of Institutional Controls protect the collection trench and any other remedial infrastructure, to prohibit use of NAPL-impacted groundwater; prohibit residential, school, and daycare use; and to control the future vapor intrusion pathway until soil and groundwater cleanup levels are achieved. The duration these controls would need to remain in place would be associated with the selected soil and groundwater cleanup alternative. Five-year reviews will be required since contamination will be left in place. The duration these controls would need to remain in place is uncertain, but is anticipated to be in excess of 10 years. The estimated present value of this alternative is approximately $0.76 million.

N-3: Excavation and Off-Site Disposal

Alternative N-3 includes the excavation of NAPL areas at the Whitney and Murphy Properties, and disposal of these excavated materials at an approved off-site disposal facility. The excavation will extend below the water table (estimated 12 feet below the ground surface). The excavation activities will collect approximately 6,000 cubic yards of NAPL-impacted soil. Excavation would continue until sampling confirms that the NAPL is completely removed. Excavated soils would be moved to a stockpile area and pre-conditioned (removal or absorption of free water) for shipment to an off-site disposal facility. Shoring will be installed to prevent collapse of the sidewalls, damage to nearby structures and impacts to the wetland/floodplain. Excavated areas would then be backfilled with clean soils, and amendments (e.g., ZVI) would be mixed below the water table to reduce soil and local groundwater concentrations and support groundwater cleanup. Excavations/backfilling will be coordinated with the remedial excavations/capping required under the soil component of the remedy. Mitigation measures may be required to address any unavoidable long or short-term impairment within the 500-year floodplain. Dewatering and appropriate treatment of the extracted water will be required in association with excavations below the groundwater table, with discharge to the Aberjona River or appropriate disposal off-site at licensed facility. Five-year review requirements triggered by remnant NAPL that will be left behind will be addressed through review of the groundwater component of the remedy. The time to achieve RAOs is estimated to be on the order of 4 weeks. The estimated present value of this alternative is approximately $3.4 million.

<u>Wetland Sediment/Soil Alternatives</u>

WTL-1: No Action

Under the No Action Alternative, no additional actions would be taken to address exposure to wetland sediment/soil. As required by CERCLA, five-year reviews would still be performed as part of the No Action Alternative. As required by the CERCLA and the NCP, the No Action Alternative serves as a baseline for comparing the effectiveness of other remedial alternatives to be developed for wetlands. The current levels of contaminants in wetland sediment/soil are assumed to remain unchanged. Except for the cost of five-year reviews, there is no cost estimated as part of this alternative.

WTL-2: Monitored Natural Recovery (MNR) and Institutional Controls

Alternative WTL-2 involves monitoring the wetland for natural processes that contain, destroy or reduce the bioavailability or toxicity of contaminants in wetland sediment/soil. The most predominant natural process would be the gradual covering of the impacted wetland sediment/soil with clean sediment/soil. The covered sediment/soil would then be inaccessible for contact by recreational visitors or ecological receptors. This mechanism would take an extended and uncertain timeframe to achieve cleanup levels in the top foot of wetland sediment/soil. This alternative also includes Institutional Controls such as fencing to prevent trespassing, signs warning to not enter or dig in the area, deed restrictions to control future intrusive work (excavation and drilling for example), and routine inspections to assure the

Institutional Controls are maintained. Institutional Controls will not address ongoing risks to ecological receptors. Five-year reviews will be required since contamination will be left in place. The estimated present value of this alternative is approximately $0.22 million.

WTL-3: Capping, Wetland Mitigation, Monitoring and Institutional Controls

Alternative WTL-3 involves actively filling in the wetland pond and scrub/shrub wetland areas with clean fill (approximately 63,000 square foot area). The thickness of the cover would be three feet to effectively isolate the high concentrations of lead, chromium, petroleum hydrocarbons, and PCBs. The cap would be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions; to satisfy regulatory ARAR requirements (*e.g.* TSCA and/or RCRA); and prevent contaminant leaching to groundwater (*i.e.* meet impermeability requirements). Native plantings appropriate to the new ground elevation and degree of soil saturation would be installed. Placement of the cap would change drainage patterns in the area. Installation of catch basins and transfer lines is anticipated. Inspection and maintenance of the cap, plantings, and drainage features would be required. Construction of at least 1.44-acre compensatory wetlands and floodplain mitigation in another location within the waterway upstream of any sensitive floodplain receptors, would also be required as raising the wetland area three feet will effectively eliminate the wetland habitat and flood storage capacity of the wetland. Mitigation would also be required for any temporary alteration of wetland/floodplain during cap construction. Native vegetation would be used for all mitigation work. Institutional Controls would be implemented to ensure long-term cap integrity and to prohibit intrusive activities unless properly controlled. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 5 weeks. The estimated present value of this alternative is approximately $1.0 million.

WTL-4: Shallow (1 foot) Excavation and Targeted Deeper (3 feet) Excavation, Off-Site Disposal, Amended Cap, Wetland Restoration, Monitoring and Institutional Controls

Alternative WTL-4 involves excavation of the top one foot of sediment/soil across the wetland, excavation to 3 feet in areas with significantly elevated contaminant concentrations, off-site disposal of excavated wetland sediment/soil, placement of an amended clean sediment/soil cap to return the wetland to the original elevation and habitat type, plantings to restore the wetland, and Institutional Controls. The final elevation of the cap would be the same as the pre-remediation elevation. Native wetland plantings would be installed to restore the wetland habitat. The cap would be adequately designed with long-term integrity for seasonal conditions, severe storms (up to a 500-year storm event), and freeze/thaw conditions. Dewatering and appropriate treatment of the extracted groundwater and any water removed from dewatering saturated sediments/soils will be required in association with excavations below the groundwater table. Treated water will be discharged to the Aberjona River or to an appropriate off-site, licensed disposal facility. An estimated total of approximately 3,700 cubic yards of material would be excavated. This estimate includes an additional approximately 1,400 cubic yards for deeper excavation in areas of significantly elevated concentrations. Periodic monitoring would be performed to evaluate cap effectiveness and to confirm wetland sediment/soil used during restoration does not become impacted by the underlying contamination. Long-term monitoring and Institutional Controls will be required to ensure the cap remains protective. Five-year reviews will be required since contamination will be left in place. The time to achieve RAOs is estimated to be on the order of 8 weeks. The estimated present value of this alternative is approximately $1.9 million.

WTL-5: Deep (3 feet) Excavation and Off-site Disposal, Backfill, and Wetland Restoration

Alternative WTL-5 includes excavation to remove all wetland sediment/soil with contaminants in excess of the cleanup levels, estimated to be approximately 63,000 square foot area, and off-site disposal of excavated sediment/soil. Pre-design investigation sampling results and confirmatory sampling will refine and determine extent of excavation. Dewatering and appropriate treatment of the extracted groundwater and any water removed from dewatering saturated soils will be required in association with excavations below the groundwater table. Treated water will be discharged to the Aberjona River or to appropriate off-site, licensed disposal facility. The excavation area would be backfilled to pre-remediation grades and the wetland habitat restored using native species. An estimated total of approximately 7,000 cubic yards of material would be excavated. Plantings and visible ground surfaces will be inspected and maintained until plantings are established. The time to achieve RAOs is estimated to be on the order of 16 weeks. The estimated present value of this alternative is approximately $2.2 million.

2. Management of Migration Alternatives Analyzed

Management of migration (MM) alternatives address contaminants that have migrated into and with the groundwater from the original source of contamination. At the SWP, contaminants have migrated from surface and subsurface releases at the Whitney, Murphy and Aberjona Properties into the site-wide groundwater. The MM alternatives for groundwater analyzed for the Site include:

- GW-1: No Action
- GW-2: Institutional Controls
- GW-3: Monitored Natural Attenuation and Institutional Controls
- GW-4: *In-Situ* Bioremediation and Institutional Controls
- GW-5: *In-Situ* Chemical Oxidation (ISCO) and Institutional Controls
- GW-6: Pump and Treat and Institutional Controls

Each of the six MM alternatives is summarized below. A more complete, detailed presentation of each alternative are found in the 2017 FS Report Addendum – Technical Report and Section 5 of the FS.

Groundwater Alternatives

The groundwater alternative would be coordinated with the selected soil and NAPL cleanup approach as excavation below the water table in the Northern Whitney Soil Area and NAPL areas presents an opportunity for shallow groundwater treatment to be enhanced through the placement of amended backfill. The amended backfill would treat shallow groundwater where the amendment is placed.

GW-1: No Action

Alternative GW-1 is the No Action Alternative. This alternative provides no active groundwater treatment. As required by CERCLA, five-year reviews would still be performed as part of the No Action Alternative. As required by CERCLA and the NCP, the No Action Alternative serves as a baseline for comparing the effectiveness of other remedial alternatives to be developed for groundwater. Concentrations of contaminants in groundwater are assumed to remain unchanged from current concentrations. Except for the cost of five-year reviews, there is no cost estimated as part of this alternative.

GW-2: Institutional Controls

Alternative GW-2 includes implementation of Institutional Controls to prohibit future use of impacted groundwater as a drinking water source and to control the future vapor intrusion pathway. However, groundwater contaminant discharge to the wetland area would continue. Five-year reviews will be required since contamination will be left in place. The estimated present value of this alternative is approximately $0.05 million.

GW-3: Monitored Natural Attenuation and Institutional Controls

Alternative GW-3 includes long-term annual groundwater monitoring to monitor the groundwater concentrations and evaluate the concentration decreases due to natural attenuation (biodegradation, volatilization, dispersion, dilution, *etc*.). Mitigation may be required for any alteration of 500-year floodplain and/or wetlands from the installation and maintenance of monitoring wells. Well locations would need to be designed so as to not interfere with the remedial infrastructure required for the soil, NAPL, and wetland components of the selected remedy. This alternative also includes the implementation of Institutional Controls to prohibit future use of impacted groundwater as a drinking water source until groundwater cleanup standards are achieved and to control the future vapor intrusion pathway. However, groundwater contaminant discharge to the wetland area would continue. Five-year reviews will be required since contamination will be left in place. Time to achieve cleanup levels is estimated from approximately 100 to 225 years. The estimated present value of this alternative is approximately $1.5 million.

GW-4: *In Situ* Bioremediation and Institutional Controls

Alternative GW-4 includes the injection of microbes or substrates into the aquifer to stimulate the biological breakdown of organic compounds, resulting in the subsequent reduced solubility of metals. These reductions would eventually achieve groundwater cleanup standards. This alternative requires the installation of several hundred injection points/wells. Two injection events are assumed, the second injection event occurring approximately two years after the initial injection event. Monitoring would be performed to follow the progress of the treatment, and additional injections would be performed if the treatment appears to be incomplete or additional treatment is periodically necessary to maintain contaminant reductions within a timely manner. Groundwater contaminant migration into the wetlands would be controlled immediately by siting of wells so that all contaminated groundwater will be treated before it migrates into the wetlands. Mitigation may be required for any alteration of 500-year floodplain and/or wetlands from the installation, operation, and maintenance of injection/monitoring wells. Well and injection well/point locations would need to be designed so as to not interfere with the remedial infrastructure required for the soil, NAPL, and wetland components of the selected remedy. This alternative also includes the implementation of Institutional Controls to prohibit future use of impacted groundwater as a drinking water source until groundwater cleanup levels are achieved, and to control the future vapor intrusion pathway. Time to achieve cleanup levels is uncertain due to difficulties with technology at greater depths, *etc*., but estimated to be approximately as much as 94 years. Five-year reviews will be required since contamination will be left in place. The estimated present value of this alternative is approximately $7.1 million.

GW-5: *In Situ* Chemical Oxidation (ISCO) and Institutional Controls

Alternative GW-5 includes the injection of oxidants into the aquifer to break down VOCs, resulting in the subsequent reduced solubility of metals, PCBs and other typically low solubility compounds. These reductions would eventually achieve groundwater cleanup standards. However, the chemicals injected into the aquifer are associated with health hazards and require extreme caution with management and application on the SWP. This alternative requires the installation of several hundred injection points/wells. Three injection events are assumed for the overburden with four injections assumed for bedrock. Monitoring would be performed to follow the progress of the treatment, and additional treatment would be performed if the treatment appears to be incomplete or additional treatment is periodically necessary to maintain contaminant levels below cleanup standards. Groundwater contaminant migration into the wetlands would be controlled immediately by siting of wells so that all contaminated groundwater will be treated before it migrates into the wetlands. Mitigation may be required for any alteration of 500-year floodplain and/or wetlands from the installation, operation, and maintenance of injection/monitoring wells. Well and injection well/point locations would need to be designed so as to not interfere with the remedial infrastructure required for the soil, NAPL, and wetland components of the selected remedy. This alternative also includes the implementation of Institutional Controls to prohibit future use of impacted groundwater as a drinking water source until groundwater cleanup levels are achieved, and to control the future vapor intrusion pathway. Time to achieve cleanup levels is uncertain due to difficulties with technology at greater depths, *etc*., but estimated to be approximately 92 years for the shallow and intermediate zones. Five-year reviews will be required since contamination will be left in place. The estimated present value of this alternative is approximately $27 million.

GW-6: Pump and Treat and Institutional Controls

Alternative GW-6 includes the installation and operation of a SWP-wide groundwater extraction and treatment system to reduce contaminant concentrations in groundwater and provide hydraulic containment, preventing further contaminant migration. The treatment system may include components such as bag filters, activated carbon vessels, metals polishing vessels, air strippers, vapor phase activated carbon, *etc*. Eighteen to twenty-two groundwater extraction wells would be installed in the overburden and bedrock. Pre-design investigation activities will include consideration of the age and upgrades to the adjacent Wildwood Source Area Property groundwater treatment system plant to accommodate and adequately treat extracted groundwater from the SWP in lieu of constructing a groundwater treatment plant on the SWP (while continuing to treat extracted water from the Wildwood Source Area Property). Operation and maintenance would include monitoring to assure that the extraction pumps are operating properly, the treatment components are in proper operation, the activated carbon and ion exchange resins are changed as needed, the air stripper is maintained, and compliance monitoring for air emissions and treated water are being performed. Groundwater contaminant migration into the wetlands would be controlled immediately by siting of wells so that all contaminated groundwater will be removed and treated before it migrates into the wetlands. Mitigation may be required for any alteration of 500-year floodplain and/or wetlands from the installation, operation, and maintenance of the groundwater treatment system. Well and piping locations, as well as the location of the treatment system, would need to be designed so as to not interfere with the remedial infrastructure required for the soil, NAPL, and wetland components of the selected remedy. This alternative also includes the implementation of Institutional Controls to prohibit future use of impacted groundwater as a drinking water source until groundwater cleanup levels are achieved, and to control the future vapor intrusion pathway. Time to achieve cleanup levels is estimated to be approximately 20 years. Five-year reviews will be required since contamination will be left in place. The estimated present value of this alternative is approximately $4.2 million.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a remedy for the SWP. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, disposal, engineering controls, or Institutional Controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all standards, requirements, criteria or limitations under any Federal environmental law and all standards, requirements, criteria or limitations under any more stringent State environmental or facility siting law, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation and Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the 2017 FS Report Addendum – Technical Memorandum, RI/FS Report, and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan, 2017 FS Report Addendum – Technical Memorandum, and RI/FS report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis for soil (Whitney, Murphy and Aberjona Properties), groundwater, NAPL and wetland sediment/soil can be found in Tables 6-1 through 6-6 of the FS, respectively, as amended through discussions presented in the 2017 FS Report Addendum – Technical Memorandum. Table 6-7 of the 2017 FS Report Addendum – Technical Memorandum, which presents a summary of the comparative analysis, is attached to this ROD as **Table K-1** (see Appendix B).

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis.

Soil:

Overall Protection of Human Health and the Environment

All alternatives except for the No Action Alternative (SW-1/SM-1/SA-1) are protective of human health and the environment. All of the alternatives other than the No Action Alternative provide for Institutional Controls to prevent future residential, school, or daycare development of the properties (except for the Existing Aberjona Residence area on the Aberjona Property) and to protect against the future vapor intrusion pathway, with additional Institutional Controls needed for the alternatives where there are components of the remedy the require protection (such as a soil cap). Alternatives SW-2/SM-2/SA-2 provide an impermeable cap above the soils to prevent exposure and prevent leaching of soil contaminants to groundwater, but do not provide for excavation of significantly contaminated soil in the saturated zone at the Northern Whitney Soil Area that could continue to impact groundwater and prolong the time to achieve groundwater cleanup levels in the area. In addition, Alternatives SW-2/SM-2/SA-2 would result in flood storage loss that requires mitigation measures within the watershed upstream of any sensitive flood receptors to address any impairment within the 500-year floodplain. The ability of the alternatives to be protective depends on the availability of suitable floodplain mitigation areas. Alternatives SW-3/SM-3/SA-3 provide for the excavation and off-site disposal of the significantly contaminated soils (*e.g.*, Northern Whitney Soil Area) and blending contaminated soil below the water table with a treatment amendment prior to backfilling which would decrease soil, groundwater and wetland impacts and provide an impermeable cap above the remaining soils above cleanup levels to prevent exposure and leaching of soil contaminants to groundwater which would reduce time to achieve groundwater cleanup levels. Alternatives SW-3/SM-3/SA-3 may use existing building foundations as part of the protective cap, if they are suitable. Caps constructed under Alternatives SW-2/SM-2/SA-2 and SW-3/SM-3/SA-3 within the 500-year floodplain need to be constructed and maintained to prevent any release of contamination during flooding. Alternatives SW-4/SM-4/SA-4 provide for the excavation and off-site disposal of all soils above cleanup levels located above the water table, along with excavation of the Northern Whitney Soil Area. Alternatives SW-3/SM-3/SA-3 and Alternatives SW-4/SM-4/SA-4 each will include potential treatment of water generated from excavations or dewatered soils and discharge of treated water to the Aberjona River. All of the alternatives will require five-year reviews since each will leave contaminated soil in place that exceeds unrestricted use risk standards.

Compliance with ARARs

All alternatives, except for the No Action and SW-2/SM-2/SA-2 Alternatives, have been developed to comply with ARARs. The SW-2/SM-2/SA-2 Alternatives will not comply with federal and state floodplain ARARs unless flood storage mitigation is possible within the watershed upstream of any sensitive floodplain receptors. This is required to compensate for floodplain storage capacity lost from the construction of the alternatives' soil caps above the current grade of the floodplain. The impermeable caps constructed as part of the SW-3/SM-3/SA-3 Alternatives will be constructed at grade so there is no loss of flood storage capacity, in compliance with floodplain ARAR standards. This will be done by partially excavating the soil within the floodplain to account for the caps' thickness. The design of the impermeable cap will comply with TSCA and RCRA ARAR requirements pertaining to capping PCBs and/or hazardous waste. Alternatives SW-4/SM-4/SA-4 meet ARARs as soils with concentrations above cleanup levels located above the water table will be removed and will be managed on-site in compliance with ARARs until disposed of at a licensed off-site disposal facility. Water and any associated air discharges generated from dewatering activities during excavations and the management of excavated soil will meet applicable ARAR discharge requirements. Alternatives SW-3/SM-3/SA-3 will not result in net filling of the floodplain and will not cause any net flood storage loss. Alternatives SW-3/SM-3/SA-3 and SW-4/SM-4/SA-4 will dispose of soils off-site at a licensed facility and comply with TSCA and RCRA ARAR requirements.

Long-Term Effectiveness and Permanence

The No Action Alternatives rate the lowest for long-term effectiveness and permanence because the risks identified in the baseline HHRA are not addressed and soil contaminants leaching to groundwater above cleanup levels remain unchanged. The long-term effectiveness and permanence of the capping and excavation (SW-3/SM-3/SA-3) and excavation only (SW-4/SM-4/SA-4) alternatives are anticipated to be high, where SW-4/SM-4/SA-4 provides for the most removal of contaminated soil. Although capping alone meets the criterion for long-term effectiveness and permanence, a larger amount of significantly contaminated soils in the unsaturated and saturated soil (*e.g.*, the Northern Whitney Soil Area) will be left in place in

Alternatives SW-2/SM-2/SA-2.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment
Alternatives SW-1/SM-1/SA-1 and SW-2/SM-2/SA-2 do not include any treatment. Alternatives SW-3/SM-3/SA-3 and SW-4/SM-4/SA-4 include very limited treatment as a component of each alternative: significantly contaminated soils (*e.g.* Northern Whitney Soil Area) will be blended with a treatment amendment to reduce soil and localized groundwater contamination (*e.g.* VOCs), treatment of water generated from excavation/dewatering prior to disposal, and the potential addition of bulking amendments to make excavated soils suitable for off-site disposal.

Short Term Effectiveness
The No Action Alternative will not be effective in the short-term in protecting human health or the environment. Because no remedial activities will occur, ongoing short-term risks will still be present. There would be no adverse short-term impacts to the public or workers because no cleanup will be performed. The SW-2/SM-2/SA-2 and SW-3/SM-3/SA-3 Alternatives meet the established RAOs for the soils, and will likely take approximately the same timeframe to achieve RAOs. Although the SW-4/SM-4/SA-4 Alternatives will also achieve RAOs for soil, these alternatives will take the longest time to implement due to the anticipated longer duration of site work, causing more prolonged disruption to property owners and greater potential for accidents.

The community and workers performing the cleanup are protected the most in the short term by Alternatives SW-2/SM-2/SA-2 because minimal soil disturbance is anticipated and no soils are transported off-site (*e.g*. less truck traffic, etc.). Alternatives SW-3/SM-3/SA-3 will require approximately 5,400 cubic yards of significantly contaminated soils to be transported off-site, and an additional approximately 12,400 cubic yards of contaminated soil to be transported off-site to prevent flood storage loss prior to cap placement (a total of approximately 18,000 cubic yards). Alternatives SW-4/SM-4/SA-4 will also require approximately 5,400 cubic yards of significantly contaminated soils, and an additional approximately 44,000 cubic yards of contaminated soil, to be transported off-site (a total of approximately 49,000 cubic yards). Alternatives SW-3/SM-3/SA-3 and SW-4/SM-4/SA-4 are the least protective of workers performing the cleanup, as these alternatives involve the handling of large volumes of significantly contaminated soil and the handling and treatment of water contaminated from the remedial process. The SW-4/SM-4/SA-4 Alternatives would pose greater risks to workers and the community compared to the SW-3/SM-3/SA-3 Alternatives since the SW-4/SM-4/SA-4 Alternatives involve a larger amount of excavation and volume of contaminated soils shipped off site, a larger amount of contaminated water requiring treatment, a larger amount of fill delivered on-site, and the most truck traffic. Air monitoring will need to be performed for worker and community protection, and workers performing the cleanup will be required to wear appropriate personal protective equipment.

Implementability
The No Action Alternative receives a high rating for implementability because no remedial actions are required. Alternatives SW-2/SM-2/SA-2 may have significant implementability issues because of the limited availability of areas for required floodplain mitigation. Regarding

the active alternatives, capping and excavation remedial components are easy to implement due to the availability of trained personnel, equipment and materials. Alternatives SW-3/SM-3/SA-3 are easier to implement and will be less disruptive to the existing on-property businesses compared to SW-4/SM-4/SA-4 because it will require the complete or partial demolition of fewer buildings (likely just on the Whitney Property) and the need to vacate the properties for less time. Alternatives SW-3/SM-3/SA-3 will require construction of impermeable caps within areas with active businesses and possible tie in of the caps into existing building foundations.

Cost
Except for the cost of five-year reviews, there is no cost estimated as part of the No Action Alternatives. Of the active alternatives, Alternatives SW-2/SM-2/SA-2 have the lowest costs, since no soil excavation/disposal is required. Building demolition, off-site transport and disposal of contaminated soils, and volume of clean fill delivered are the most costly components of the SW-3/SM-3/SA-3 and SW-4/SM-4/SA-4 Alternatives. The SW-4/SM-4/SA-4 Alternatives are the most expensive alternatives, because of the larger volumes of soil to be excavated/disposed of. See **Table K-1** in **Appendix B** for a summary of costs for all alternatives.

State and Community Acceptance
The State has expressed its support for Alternative SW-3/SM-3/SA-3. The State does not believe that Alternative SW-1/SM-1/SA-1 provides adequate protection of human health and the environment. The State does not support SW-2/SM-2/SA-2 because it does not use treatment as a permanent solution.

During the public comment period, members of the community expressed support for either Alternatives SW-3/SM-3/SA-3 or SW-4/SM-4/SA-4. Alternatives SW-1/SM-1/SA-1 and SW-2/SM-2/SA-2 were not considered adequately protective.

NAPL:

Overall Protection of Human Health and the Environment
Alternative N-1 does not eliminate the NAPL source material nor prevent its movement; therefore, the N-1 Alternative is not protective of human health or the environment. The N-2 and N-3 Alternatives protect human health and the environment by reducing or eliminating a continuing NAPL source of contamination to soil, groundwater and the wetlands. The N-3 Alternative will more effectively and quickly eliminate the NAPL through excavation, while the N-2 Alternative will rely on slow removal of the NAPL by skimming and controlling movement to the wetland. The N-2 Alternative, which uses skimming and movement control technologies, may not be completely effective at recovering NAPL and/or preventing NAPL discharge to the wetland. The N-2 Alternative also includes Institutional Controls to prevent human contact with the NAPL until its removal is complete. The N-3 Alternative is more protective of human health and the environment than the N-2 Alternative, since a larger volume of NAPL will be removed over less time resulting in a lower risk of discharge to the wetlands and faster groundwater remediation. As part of the N-3 Alternative the addition of amendments such as ZVI to address any remnant NAPL contamination in the subsurface soil prior to backfilling the excavation work further increases the protectiveness of the alternative.

Compliance with ARARs

There are no chemical-specific ARARs for NAPL. However, the N-1 Alternative will not meet risk-based standards developed using chemical-specific TBCs since no removal or containment of NAPL will occur. Alternatives N-2 and N-3 can be implemented in compliance with location and action-specific ARARs, in particular, State standards that require all NAPL be removed to the extent practicable. Alternative N-3 achieves risk-based standards developed using chemical-specific TBCs because removal of the NAPL through excavation will prevent its continuing discharge to the wetland and will eliminate it as a continuing source of contamination to soil and groundwater, facilitating the cleanup of those media. It is less certain that the N-2 Alternative will achieve risk-based standards developed using chemical-specific TBCs, and more time may be required to remove the NAPL from the subsurface and eliminate the NAPL movement. Alternatives N-2 and N-3 do not result in net filling of the 500-year floodplain and will not cause any net flood storage loss. Water and air discharges generated from dewatering activities during excavation and the management of excavated soil under Alternative N-2 (during trench installation) and during the excavation work under Alternative N-3 will meet applicable ARAR discharge requirements.

Long-Term Effectiveness and Permanence

The N-1 Alternative has no long-term effectiveness or permanence due to lack of NAPL removal. Alternative N-3 is expected to have the best long-term effectiveness and permanence because the NAPL will be excavated and disposed off-site. This process is permanent, reliable, and certain to reduce risks. The N-2 Alternative is expected to have less long-term effectiveness than Alternative N-3 since residual NAPL may remain.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

N-1 Alternative would provide no reduction in toxicity, mobility and volume of NAPL through treatment. Alternative N-2 may have some very limited treatment through the required treatment of water generated during the installation of the trench. Alternative N-3 also includes very limited treatment of a potentially larger volume of contaminated water generated both from the excavation and from dewatering any saturated excavated soil. Treatment will achieve both water and air discharge standards. There may also be some reduction of pollutant mobility through the addition of bulking agents to allow for off-site disposal of the excavated material.

Short Term Effectiveness

The No Action Alternative will not be effective in the short-term in protecting human health or the environment, but because no remedial activities will occur, there will be no adverse impacts to the public or workers performing the cleanup. Although Alternative N-2 involves very little short term risk to workers, NAPL is brought to the surface where it would need to be appropriately managed for an extended period of time. The N-3 Alternative will achieve RAOs in the shortest period of time since NAPL will be excavated and no longer serve as a source of impacts to soil, groundwater, and the wetland. However, Alternative N-3 may be associated with short-term risks to workers performing the cleanup due to the required handling of NAPL-impacted materials and more disruption to property owners. Air monitoring will need to be performed for worker and community protection, and workers performing the cleanup will be required to wear appropriate personal protective equipment.

Implementability
Alternative N-1 is the easiest to implement because it does not involve excavation and off-site disposal or the construction, operation, or maintenance of a remedial system or enforcement of Institutional Controls. The N-2 Alternative is more difficult to implement than the N-3 Alternative because it requires the construction, operation or maintenance of a remedial system (*i.e.* collection wells and trench) to recover NAPL in the subsurface. The trench and collection well system would also need to be installed and maintained so that it doesn't interfere with any of the caps to be installed as part of the soil component of the remedy. In addition, Alternative N-2 may be less reliable for eliminating the subsurface NAPL and may require the use of additional remedial technologies in the future to achieve RAOs. The reliability of the N-3 Alternative is high because excavation and off-site disposal are relatively routine tasks. However, it produces the highest amount of disruption to property owners and greater impact to the community from increased truck traffic during its brief implementation duration. Excavation work needs to be coordinated with the other components of the remedy: soil excavation/capping, sediment excavation, and the groundwater pump and treat system.

Cost
Except for the cost of five-year reviews, there is no cost estimated as part the N-1 Alternative. Alternative N-3 costs are more than four times that of the N-2 Alternative. See **Table K-1** in **Appendix B** for a summary of costs for all alternatives.

State and Community Acceptance

The State has expressed its support for Alternative N-3. The State does not believe that Alternative N-1 provides adequate protection of human health and the environment. The State does not support N-2 because it may not be effective in removing all NAPL from the subsurface.

During the public comment period, members of the community expressed support for Alternative N-3. Alternatives N-1 and N-2 were not considered adequately protective.

Wetland Sediment/Soil:

Overall Protection of Human Health and the Environment
All alternatives except for the WTL-1 Alternative and WTL-2 Alternative are protective of human health and the environment. Alternative WTL-2 is not protective of the environment because conditions do not appear to be suitable for natural recovery, although Institutional Controls to prevent access to the wetland would be in place for the protection of human health. The alternative does not include measures to protect the environment. Alternative WTL-3 provides a cap above the wetland sediments/soils to prevent human and environmental exposures, but does not provide for excavation of wetland sediment/soil. Therefore, it will require wetland and flood storage mitigation elsewhere nearby within the watershed. Alternative WTL-4 provides for the excavation and off-site disposal of the high concentration wetland

sediments/soils, and provides a cap above the remaining lower concentration wetland sediments/soils to prevent exposure. The excavation of wetland sediments/soils and restoration of the wetland to initial grades would prevent the need for further wetland or flood storage mitigation (other than restoring the surface of the cap to native wetland/aquatic habitat and restoring any access ways to the excavation/cap areas). Alternatives WTL-3 and WTL-4 also provide for Institutional Controls to prevent disturbance of the cap and long-term monitoring to confirm that cleanup levels continue to be met over time. Alternative WTL-5 provides for the excavation and off-site disposal of wetland sediments/soils above cleanup levels, restoration of the wetland to initial grades to prevent the need for further wetland or flood storage mitigation measures, and no institutional controls. Therefore, WTL-5 is most protective of human health and the environment.

Compliance with ARARs
All alternatives except for the WTL-1 and WTL-2 Alternatives will comply with ARARs. Under Alternative WTL-1 PCB-impacted wetland sediment/soil will not be removed or treated so will not comply with chemical-specific ARARs for PCBs and metals. Alternative WTL-2 is not expected to meet chemical-specific ARARs for PCBs and metals within a reasonable period of time since MNR is not effective for PCBs and metals. The WTL-3 Alternative does not include adequate provisions to comply with ARARs requiring wetland and flood storage mitigation within the watershed to replace wetland/floodplain filled to install the cap. The WTL-4 and WTL-5 Alternatives will comply with federal and state waste disposal regulations since wetland sediment/soil with PCBs exceeding TSCA thresholds will be excavated and disposed off-site, rather than capped on-site. WTL-4 and WTL-5 Alternatives will also reestablish the wetlands in place so that wetland mitigation may occur in place. Alternatives WTL-4 and WTL-5 do not result in net filling of the 500-year floodplain and will not cause any net flood storage loss. ARAR standards also require that caps need to be designed and maintained so as to not result in any contaminant releases in up to a 500-year storm event. Water and air discharges generated from dewatering activities during excavation and the management of excavated sediment/soil under Alternatives WTL-4 and WTL-5 will meet applicable ARAR discharge requirements. All work within the wetlands under Alternatives WTL-3, WTL-4, and WTL-5 will meet Action-specific standards for protecting water quality. Excavated sediments/soils generated from Alternatives WTL-4 and WTL-5 will be managed on-site in compliance with ARARs until disposed of at a licensed off-site disposal facility. WTL-5 Alternative removes all wetland sediments/soils above action levels and does not require Five Year Reviews because no waste will be left in place. EPA has determined that Alternative WTL-5 is the LEDPA under the federal Clean Water Act for addressing contaminants in the wetland, while protecting wetland resources.

Long-Term Effectiveness and Permanence
The WTL-1 and WTL-2 Alternatives would be neither effective in the long-term nor provide permanent protection from contaminated sediment/soil because contaminant concentrations exceeding cleanup levels will remain and exposure pathways to these contaminants continue to exist, indicating a high level of residual risk remains. The long-term effectiveness and permanence of the WTL-5 Alternative is the highest. With Alternative WTL-5, all contaminated

wetland sediments/soils would be removed, backfilled with clean wetland soil, and restored to original grades. Although capping meets the criterion for long-term effectiveness and permanence, a large amount of significantly contaminated wetland sediment/soil will remain in place in Alternative WTL-3. The significantly contaminated wetland sediments/soils are removed in Alternative WTL-4, but this alternative, like the WTL-3 Alternative, relies on cap integrity to maintain protectiveness. Long-term effectiveness is dependent on durability of the cap.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment
The WTL-1, WTL-2, WTL-3, and WTL-4 Alternatives do not include any treatment so do not meet the criterion. Alternatives WTL-4 and WTL-5 include limited treatment of any water generated from the excavation or from dewatering sediments/soils prior to discharge and any bulking agents used to reduce contaminant mobility prior to off-site disposal.

Short Term Effectiveness
The WTL-1 Alternative will not be effective in the short-term in protecting human health or the environment, but because no remedial activities will occur, there will be no adverse impacts to the public or workers performing the cleanup. Alternative WTL-2 will have limited effectiveness in preventing human contact once Institutional Controls are established. The WTL-3 Alternative ranks the lowest for short term effectiveness due to the deleterious effects the filling of the wetland will have on wetland species. The WTL-3 Alternative will also require the longest time to achieve RAOs due to the need to construct a compensatory wetland elsewhere nearby within the watershed, prior to capping the wetland, and the time required for establishment of the replacement wetland.

Alternatives WTL-4 and WTL-5 rank intermediate for short term effectiveness. Because these alternatives include the excavation and handling of significantly contaminated wetland sediment/soil, air monitoring will need to be performed for worker and community protection, and workers performing the cleanup will be required to wear appropriate personal protective equipment. In addition, there will be temporary adverse impacts to wetland species within the work area.

Implementability
All five alternatives rank highly for implementability, except for Alternative WTL-3 where the feasibility of constructing compensatory wetland/flood storage elsewhere nearby within the watershed will be difficult/uncertain. Alternative WTL-1 is the easiest to implement because no remedial action will be taken. Alternative WTL-2 will also be easy to implement since long-term monitoring requires few resources and can be easily implemented. For Alternatives WTL-3, WTL-4 and WTL-5, there are no technical barriers associated with capping, excavation or institutional controls. The necessary trained personnel, equipment and materials are readily available to implement each alternative.

Cost
The range in estimated cost for all five alternatives is from $0 million for WTL-1 (No Action)

(except the cost of five-year reviews) to $2.2 million for Alternative WTL-5. The WTL-5 Alternative is the most costly alternative and is moderately more costly than the WTL-3 ($1.0 million) and WTL-4 ($1.9 million) Alternatives. See **Table K-1** in **Appendix B** for a summary of costs for all alternatives.

State and Community Acceptance

The State has expressed support for Alternative WTL-5. The State does not believe that Alternative WTL-1 provides adequate protection of human health and the environment. The State does not support Alternative WTL-2 and WTL-3 because they do not use treatment as a permanent solution.

During the public comment period, members of the community expressed support for either Alternatives WTL-4 or WTL-5. Alternatives WTL-1, WTL-3 and WTL-3 were not considered adequately protective.

Groundwater:

Overall Protection of Human Health and the Environment
The protectiveness of all the groundwater alternatives, except the GW-1 No Action Alternative, is in part contingent on the effectiveness of the source control alternatives for NAPL, soil, and the wetlands. Alternative GW-1 (No Action Alternative) fails this criterion because it does not address risks posed by contaminated groundwater. Alternative GW-2 (Institutional Controls) fails the overall protection of human health and the environment criterion because, although it would address human contact risks, it will not reduce, control or eliminate risks to human health or the environment. Alternative GW-3 does not meet this criterion because relying on monitored natural attenuation to achieve cleanup standards will not achieve cleanup standards within a reasonable time period (100-225 years) compared with active remedial alternatives. The GW-4 and GW-5 Alternatives pass this criterion, but the distribution and performance challenges of groundwater cleanup at greater depths may prevent the injection alternatives from effectively achieving groundwater cleanup standards. The GW-6 Alternative passes the overall protection of human health and the environment. The alternative protects human health by prohibiting use of contaminated groundwater as a drinking water source via Institutional Controls until cleanup levels are met in approximately 20 years. GW-3 through GW-6 all will include measures to prevent migration of contaminated groundwater into the adjacent wetlands. The time to achieve cleanup levels for Alternatives GW-3 through GW-6, ranked from the longest to shortest time frames are GW-3 (approximately 100 to 225 years), GW-4 (approximately 94 years), GW-5 (approximately 92 years) and GW-6 (approximately 20 years). The GW-6 Alternative also provides for hydraulic containment of groundwater contaminants, limiting movement of contamination that poses a risk to the adjacent wetlands.

Compliance with ARARs
The No Action Alternative fails because it contains no remedial action to address ARAR requirements to restore the groundwater. Alternative GW-2 fails the compliance with ARARs criterion because it includes no provision to restore groundwater to required ARAR-based

cleanup levels. Alternative GW-3 does not pass this criterion because the estimated time to achieve cleanup levels does not meet TBC standards for Monitored Natural Attenuation remedies to meet groundwater cleanup standards within a reasonable time period, compared to active treatment alternatives (100 to 225 years compared to 20 years for the pump and treat alternative). Alternatives GW-4, GW-5 and GW-6 will meet chemical-specific ARARs because of treatment of groundwater contamination throughout the overburden and bedrock, although there is less certainty about the effectiveness in the two injection alternatives fully meeting groundwater cleanup standards. Alternative GW-6 is expected to achieve ARAR-based groundwater cleanup goals in the shortest timeframe (approximately 20 years). There are no location or action-specific ARARs for Alternative GW-1. The GW-3, GW-4, GW-5, and GW-6 Alternatives all will meet ARAR requirements for mitigation of any alteration of 500-year floodplain and/or wetlands from the installation and maintenance of injection/monitoring wells or piping systems. Alternative GW-6 also will meet all water and air treatment and discharge ARAR requirements for the pump and treat system.

Long-Term Effectiveness and Permanence
The No Action Alternative is neither effective in the long term nor effective with respect to permanence because it will have the highest residual risk due to lack of Institutional Controls or groundwater treatment. Due to the need for permanent Institutional Controls for the GW-2 Alternative and that the alternative does not address ongoing migration of contamination to the wetlands, this alternative is considered less effective in the long term than the remaining alternatives. Alternative GW-3, which is expected to require over 100 years to achieve cleanup levels, may require that institutional controls remain in place for an extended period of time, which negatively impacts its long-term effectiveness. Also, it is not known whether natural process alone will ultimately reduce groundwater contaminant levels to cleanup standards. Alternatives GW-4, GW-5, and GW-6 are all expected to have good long-term effectiveness due to the combination of Institutional Controls and active treatment. Rebounding concentrations may occur with the GW-4 and GW-5 Alternatives along with the formation of undesirable breakdown products and potentially temporary metals mobilization. While rebound may also occur with Alternative GW-6, it can be addressed through operational changes to pumping while maintaining containment of impacted groundwater. Treatment residuals formed as part of the GW-6 Alternative can be properly managed and pose minimal risk.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment
The No Action, GW-2, and GW-3 Alternatives do not meet this criterion because treatment is not part of the alternatives. Alternative GW-6 scores the highest for this criterion for extracting and treating contaminated groundwater. The GW-4 and GW-5 Alternatives scored intermediate for this criterion. For the GW-4 Alternative, contaminant concentrations over the cleanup levels will be treated, but residuals may remain. Toxic breakdown products (such as vinyl chloride) may potentially form with the implementation of Alternative GW-4 and metals may be temporarily mobilized by the treatment of groundwater associated with the GW-5 Alternative.

Short Term Effectiveness
The No Action and GW-2 Alternatives have no impact on human health and the environment as

a result of implementation. The GW-3 Alternative may have some minor impact due to monitoring well installation, sampling, and maintenance and relies on permanent Institutional Controls. The short-term effectiveness of the GW-3 Alternative relies on long-term Institutional Controls, while the GW-4, GW-5, and GW-6 Alternatives will prevent human exposure to contaminants in groundwater through Institutional Controls, preventing use of groundwater as drinking water until cleanup levels are achieved and active treatment. Alternative GW-6 is predicted to achieve groundwater cleanup goals more quickly than the other alternatives. Reagents used under the GW-4 Alternative would be of low toxicity while exposure to treatment residuals associated with the GW-6 Alternative can be readily controlled. The GW-5 Alternative is ranked the lowest in terms of short term effectiveness because the chemical oxidants are reactive and require special handling, and migration of oxidants to the wetland area may pose a concern.

Implementability

Alternative GW-1 is the easiest to implement because it does not involve the construction, operation or maintenance of remedial systems or enforcement of Institutional Controls. The GW-2 Alternative would also be easy to implement because it only requires the establishment and enforcement of Institutional Controls. Alternative GW-3 would be easier to implement than the GW-4, GW-5 or GW-6 because it would only involve installation, sampling, and maintenance of monitoring wells, rather than active treatment infrastructure. Of the active remedial alternatives considered for groundwater, Alternative GW-6, though it includes the construction of a treatment plant and installation of transfer lines and extraction wells, is easier to implement in the short term than the GW-4 and GW-5 Alternatives because these alternatives require the installation of several hundred injection points/wells and effective reagent dispersal with greater depths in overburden and in the bedrock is uncertain. The reliability of the GW-6 Alternative is high because groundwater extraction, treatment, and discharge are relatively routine tasks and equipment and services required for implementation are readily available. Alternatives GW-3, GW-4, GW-5, and GW-6 all have varying levels of implementability issues with installing/maintaining monitoring/treatment wells and other groundwater infrastructure in areas also subject to remedial measures being taken to address soils, NAPL, and wetland (*e.g.* protecting impermeable caps).

Cost

The range in estimated cost for all six alternatives is from $0 million for GW-1 (No Action) Alternative (except for the cost of five-year reviews) to $27 million for the GW-5 Alternative. See Table 6 (alternative comparison table) for a summary of costs for all alternatives. Of the active remedial alternatives considered for groundwater, Alternative GW-6 has the lowest cost (approximately $4.2 million). See **Table K-1** in **Appendix B** for a summary of costs for all alternatives.

State and Community Acceptance

The State has expressed support for Alternative GW-6. The State does not believe that Alternative GW-1 provides adequate protection of human health and the environment. The State does not support Alternatives GW-2 and GW-3 because they do not use treatment as a permanent solution.

During the public comment period, the members of the community expressed support for Alternative GW-6. Alternatives GW-1 and 2 were not considered adequately protective.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is a comprehensive remedy which utilizes source control and management of migration components to address the principal SWP risks in soil (refers to Alternatives SW-3, SM-3 and SA-3), groundwater (refers to selected Alternative GW-3) and wetland sediment/soil (refers to selected Alternative WTL-5), as well as NAPL (refers to selected Alternative N-3) which serves as a continuing source of contamination to groundwater as contaminants leach/dissolve from the NAPL and migrate to groundwater. Source control measures are required to address soil, NAPL, and wetland sediment/soil at the SWP that present unacceptable risks to human health or to environmental receptors, exceed ARARs, or contribute to exceedances of groundwater and/or soil ARAR and risk-based standards. The management of migration component addresses contaminants in groundwater underlying the SWP that exceed ARARs or otherwise pose an unacceptable risk. Of all the alternatives, the selected remedy best satisfies the statutory criteria for remedy selection.

The major components of the remedy are as follows:

1. Excavation and off-site disposal of approximately 5,400 cubic yards of significantly contaminated soil at the designated Northern Whitney Soil Area (See **Figure L-1** denoting "Excavation" and "Deeper Excavation"), and blending remaining contaminated subsurface soil below the water table with an amendment (e.g., ZVI) prior to backfilling to provide soil and localized groundwater treatment. In addition, excavation and off-site disposal of approximately 12,400 cubic yards of soil in the Murphy upland, Whitney, and Aberjona Property areas to facilitate installation of impermeable caps[14] (for a total of approximately 18,000 cubic yards of excavated soil). Installation of impermeable caps over areas with lower concentration soils that exceed cleanup levels to reduce soil exposure risks and/or prevent contaminant movement to groundwater (See **Figure L-1** denoting "Cap Area");
2. Excavation and off-site disposal of NAPL in the Murphy and Whitney Property areas, including approximately 6,000 cubic yards of NAPL-contaminated soil and blending any remaining NAPL-contaminated soil below the water table with an amendment (e.g., ZVI) prior to backfilling to provide soil and localized groundwater treatment (See **Figure L-2**);

[14] A cap is considered an impermeable barrier that meets applicable regulatory- (*e.g.*, TSCA and/or RCRA) or risk-based requirements, as appropriate, and mitigates contaminated soil risks by preventing direct contact, movement to groundwater and erosion.

3. Containment and cleanup of groundwater contaminants throughout OU4 by pumping and treating the groundwater (See **Figure L-3**);
4. Excavation and off-site disposal of approximately 7,000 cubic yards of wetland sediment/soil from the Murphy Wetland exceeding cleanup levels and wetland restoration (See **Figure L-4**);
5. Long-term monitoring and periodic Five-Year Reviews;
6. Institutional Controls to maintain the integrity of the soil caps and other remedial components; to prevent development of the properties for residential, school, and daycare use; to prohibit use of contaminated groundwater until cleanup levels are met; and to require evaluation of the vapor intrusion pathway if a change in usage of any of the existing buildings is contemplated, or as part of new building construction, including any addition to existing buildings on any of the properties. To facilitate future use and redevelopment of the SWP consistent with the cleanup, Institutional Controls will be established to preserve the remedy, and appropriately manage impacted soil and groundwater encountered during future intrusive activities (*e.g.* installing subsurface utilities, building foundations/slabs, etc.,) to protect human health and the environment; and
7. The remedy is estimated to cost approximately $19.1 million and is expected to take 1-2 years to construct. Groundwater is estimated to achieve cleanup standards in 20 years.

2. Description of Remedial Components

The selected remedy is consistent with EPA's preferred alternatives outlined in the July 2017 Proposed Plan.

<u>Common components of the Remedy for all media throughout the SWP are:</u>

Institutional Controls

In order to protect human health by controlling potential exposures to contaminated soils, NAPL and groundwater, the selected remedy relies on the use of Institutional Controls including limitations on land and groundwater uses and activities. Institutional Controls are also necessary for the protection of the selected remedy, including limitations on uses and activities that interfere with or disturb components of the remedy. Institutional Controls will be required to prevent residential, school, and daycare uses of the current industrial/commercial portions of the Whitney, Murphy and Aberjona Properties. Institutional controls will also be necessary to: (a) prohibit use of impacted groundwater until cleanup levels are achieved; (b) maintain the integrity of the caps and other remedial infrastructure; and (c) require the evaluation of the vapor intrusion pathway if a change in building usage of any of the existing buildings is contemplated or as part of new building construction, including any addition/alteration to existing buildings on any of the properties. Should someone wish to demonstrate that there are no unacceptable risks from vapor intrusion and therefore mitigation systems are not required, an evaluation of vapor intrusion risks (following EPA-approved procedures and subject to EPA approval) may be performed prior to a change in building usage or the building of structures above the VOC plume to demonstrate that vapor intrusion risks are within or below EPA's target risk levels (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1). To facilitate future use and redevelopment of the SWP consistent with the cleanup, Institutional Controls will be established to preserve the remedy, and appropriately manage impacted soil and groundwater encountered during future intrusive activities (*e.g.* installing subsurface utilities, building foundations/slabs, *etc*.) to protect human health and the environment. The details of the Institutional Controls will be resolved during the pre-design and remedial design phase in coordination with the parties performing the Remedial Action, impacted landowners, local officials, and MassDEP. Institutional Controls may be implemented through measures that may include, but are not limited to, a local Town ordinance, a Notice of Activity and Use Limitation (NAUL), or a Grant of Environmental Restriction and Easement (GERE)[15].

Under TSCA regulatory standards at 40 C.F.R. §761.61(c), the Region has made a determination that addressing remnant PCBs that exceed unrestricted use levels but don't exceed recreational exposure levels through Institutional Control restrictions on residential, school, and daycare use of the SWP properties (except for the Aberjona residential area), as well as drinking water restrictions until PCB groundwater cleanup standards are achieved, as set out in this Record of Decision, will not pose an unreasonable risk of injury to health or the environment. See TSCA Determination included as **Appendix E** to this ROD.

Five-Year Reviews

At the conclusion of remedy construction, hazardous substances, pollutants or contaminants will remain at the SWP, as is also the case at other Operable Units within the Wells G&H Site. Therefore, as required by law, EPA will review the SWP remedy to assure that the remedial action continues to protect human health and the environment at least once every five years as part of the Agency's five-year reviews for the entire Site[16]. These five-year reviews will evaluate the components of the remedy for as long as contaminated media above CERCLA risk levels remain in place. The purpose of the five-year review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is or will be protective of human health and the environment. The five-year review will document recommendations and follow-up actions as necessary to ensure long-term protectiveness of the remedy or bring about protectiveness of a remedy that is not protective. These recommendations could include providing additional response actions, improving O&M activities, optimizing the remedy, enforcing access controls and Institutional Controls, and conducting additional studies and investigations.

<u>Components of the remedy specific to the soil, NAPL, groundwater, and wetland sediment/soil</u>

[15] NAULs and GEREs are approved forms of Massachusetts land use restrictions established under the MCP.

[16] The next five-year review for the Site (the fifth) is due in September 2019. The start of five year reviews was triggered by the initiation of the ground water pump and treat remedies in OU1.

remediation are:

Soil Remediation

The selected remedy component for SWP soil, Excavation, Off-Site Disposal, Capping, and Institutional Controls, includes the following components:

- Pre-design investigations to further define the horizontal and vertical extents of soil contamination, including the extent of PCBs greater than or equal to 50 mg/kg;
- Pre-design investigations to understand the structural integrity of the Whitney Building, and, as necessary, any other buildings and the potential presence of hazardous building materials for abatement/management;
- Bench-scale testing of soil amendments (*e.g.* ZVI) for backfill to treat and mitigate localized soil and groundwater contamination (with emphasis on reducing chlorinated VOCs);
- Sequencing Plan for implementing the soil remedy in a manner that minimizes disruptions to on-going business operations, to the extent practical, including determining whether existing business on the properties will need to be relocated;
- Design, site preparation and building demolition, as required;
- Installing any wetland/floodplain mitigation measures that may be required, establishing stormwater/erosion control measures, clearing and grubbing of excavation areas, relocating utilities to implement excavation, installing temporary roads to support excavation, and land surveying all clean-up infrastructure to be left in place (*e.g.*, impermeable caps, monitoring wells);
- Installation of shoring around the perimeter of excavations, as required. The shoring may be necessary to prevent collapse of the excavation sidewalls, impacts to the nearby wetlands/floodplain, and damage to nearby structures;
- Excavate approximately 5,400 cubic yards of significantly contaminated soil at the Northern Whitney Soil Area[17], as well as approximately 12,400 cubic yards of soil across the SWP to facilitate capping[18] while complying with federal and State ARARs, including causing no net flood storage loss (for a total of approximately 18,000 cubic yards of excavated soil). Perform confirmation sampling to demonstrate compliance with excavation goals. Manage excavated soils on-site based on their level of contamination and then dispose off-site at a licensed facility. Add amendments, such as Portland cement, to the excavated soil to meet off-site disposal facility standards, if required. At

17 See Figure L-1 denoting “Excavation” and “Deeper Excavation” areas.

18 See Figure L-1 denoting “Cap Area”.

the Northern Whitney Soil Area, address any remaining contamination left at the bottom of the excavations below the water table by blending a treatment amendment to reduce VOCs and provide soil and localized groundwater treatment[19]. Backfill excavations with amended soil below the water table and clean soil above the water table (leaving space to install an impermeable cap at the original grade). Construct the impermeable cap across the SWP where soils are above Cleanup Levels, conceptually including geomembranes, geotextiles and 2 feet of imported material (*e.g*., common borrow, subbase and asphalt, clean soil, *etc*.). Install the cap over remaining contaminated soils exceeding cleanup criteria in the subsurface to prevent direct contact, movement to groundwater and erosion (see **Figure L-5**). Restoring the SWP to original grades for no net flood storage loss;

- Dewater the portion of the excavation that extends below the water table and any excavated soils that require dewatering, treat the water through a temporary treatment system and discharge the treated water to the Aberjona River (or appropriate off-site disposal at permitted facility, or appropriate approved discharge to Publicly Owned Treatment Works (POTW), or appropriate approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property);

- Air monitoring during the excavation/capping, as well as monitoring of the adjacent wetlands/waterways, to ensure no contaminant releases impact human health and/or environment during the cleanup activities, as required;

- Implement a long-term inspection and maintenance plan to ensure impermeable cap integrity, maintenance, and repair and to maintain any required wetland/floodplain mitigation and/or stormwater controls or other remedial infrastructure; and

Long-term monitoring of environmental media to evaluate remedy effectiveness.

Figure L-1 provides a conceptual layout of the soil remedy. **Figure L-5** provides conceptual fill/cap designs for the proposed impermeable caps associated with the Remedy. The Remedy on the Whitney Property includes the demolition of all or part of the Whitney building (including removal of any contaminated media (*e.g.* asbestos, *etc*.) prior to demolition), as required; installation of shoring around the perimeter of the excavation to prevent collapse of the excavation sidewalls and impacts to the nearby wetlands/floodplain; the excavation and off-site disposal of approximately 5,400 cubic yards of significantly contaminated soils; and removal of the existing drain line from the Whitney building floor drain to the Massachusetts Water Resources Authority (MWRA) sewer manhole as indicated in **Figure L-1** (denoting "Excavation" and "Deeper Excavation"). The Northern Whitney Soil Area denoted as "Excavation" is expected to be excavated to groundwater table, which ranges approximately 6 feet to 10 feet below ground surface (approximate average depth of 8 feet below ground surface), while the "Deeper Excavation" is estimated to be excavated below the groundwater level to 15

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19 See Figure L-1 denoting "Deeper Excavation" where amendment will be blended with soils within the shallow and upper portion of the intermediate groundwater zone (e.g. blending estimated from bottom of excavation to 24 feet below ground surface).

feet below ground surface. Confirmation sampling will be performed to demonstrate compliance with excavation goals. Soil at the bottom of the excavation below the water table will be blended with an amendment to reduce VOCs and provide soil and localized groundwater treatment. The Northern Whitney Soil Area denoted "Deeper Excavation" will be blended with an amendment from the bottom of excavation (e.g., 15 feet below ground surface) to 24 feet below ground surface. Excavations will be backfilled with blended soil amendment below the water table and clean soil above the water table (leaving space to install the impermeable cap at grade).

Some of the excavation will extend below the water table (e.g., **Figure L-1**) denoted "Deeper Excavation") and require dewatering. The area of soil excavation is expected to overlap in some parts with the area of NAPL-contaminated material to be excavated. The dewatering water is expected to be treated to appropriate levels prior to proper discharge into the Aberjona River (or appropriate off-site disposal at permitted facility, or appropriate approved discharge to the POTW, or appropriate approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property)). Treatment may include storage and settling tanks, filtration (*e.g.*, bags filters), air stripping to remove VOCs, activated carbon to remove PCBs (as well as VOCs), and ion exchange resins to remove metals. Construction of a dewatering pad to handle the saturated soils and a temporary groundwater treatment system will be necessary.

The Remedy requires some shallow excavation of soils prior to cap installation so that there is no net loss of flood storage within the floodplain (see **Figure E-4** illustrating the locations of the floodplain and **Figure L-1** for the locations of the "Cap Area"). The Remedy will include air monitoring during the excavation/capping, as well as monitoring of the adjacent wetlands/waterways, to ensure no contaminant releases impact human health and/or environment during the cleanup activities, as required. For the Remedy on the Murphy and Aberjona Properties, the existing building concrete foundation and slab conditions may be evaluated and assessed during design for adequacy to serve as a component of the cap, assuming they satisfy the remedial action objectives and impermeable cap standards established by ARARs. The Remedy assumes these existing Murphy and Aberjona building concrete foundations and slabs are in good condition and will serve as adequate cap. For the Whitney Property, any concrete foundation and slab remaining intact after building demolition may be evaluated and assessed during cap design for adequacy of satisfying the remedial action objectives and ARARs impermeable cap standards. Approximately 5,200 cubic yards, 6,900 cubic yards and 300 cubic yards of soil (a total of 12,400 cubic yards) will be excavated from the Whitney, Murphy and Aberjona Properties, respectively, to facilitate capping. A conceptual plan view of the "Cap Area" is provided in **Figure L-1**, and conceptual cap designs are provided on **Figure L-5**. Alternative cap designs will be considered during remedial design. If thinner caps can be designed and constructed while continuing to meet performance standards, then the amount of material required to be excavated may be further minimized.

Approximately 18,000 cubic yards of contaminated soil will be excavated throughout the SWP. Soil and all other media generated by the remedial action will be evaluated to determine if it meets the definition of a listed hazardous waste or if it exceeds characteristic hazardous waste standards. Portions may also be Toxic Substance Control Act (TSCA) waste, based upon existing data and pre-design investigations. Pre-design investigations will further characterize the extent of contamination (including PCBs) and excavated soils will be managed on-site based on contaminant characteristics, prior to being transferred off-site for disposal at a properly licensed facility. Amendments, such as Portland cement, may be added to the excavated soil to meet off-site disposal facility standards, if required. Prior to refilling the excavations, a geotextile fabric or equivalent will be placed to visually distinguish the clean imported material from the underlying impacted material left in place. The excavations will be backfilled with clean soil (with amendments, as applicable), and the remaining soils exceeding cleanup levels will be covered with the impermeable cap to prevent direct contact, minimize movement of soil contaminants to groundwater (*e.g.*, leaching), and mitigate the potential for erosion to result in impacts to the wetland/floodplain. The cap within the 500-year floodplain will be designed, constructed, and maintained to prevent any releases in the event of flooding (up to a 500-year flood event). Restoration will include returning the area to the pre-existing conditions, and applying seed (native species to the extent practicable), mulch and/or soil amendments to restore the disturbed areas. The properties will be restored to original grades to prevent flood storage loss within the floodplain. Cleanup levels for soil are shown in **Table L-2 (see Appendix B)**.

Under TSCA regulatory standards at 40 C.F.R. §761.61(c), the Region has made a determination that the manner of sampling, storage, cleanup, and disposal of PCB-contaminated soil as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment. See TSCA Determination included as **Appendix E** to this ROD.

NAPL Remediation

The selected remedy component for NAPL, Excavation and Off-Site Disposal, includes the following components:

- A pre-design investigation to define the extent of NAPL and NAPL-impacted soils;

- Bench-scale testing of soil amendments (*e.g.* ZVI) for backfill to treat and mitigate localized soil and groundwater contamination;

- Sequencing Plan for implementing the NAPL remedy in a manner that minimizes disruptions to on-going business operations, to the extent practical;

- Installing any wetland/floodplain mitigation measures that may be required, establishing stormwater/erosion control measures, clearing and grubbing of excavation areas, relocating utilities to implement excavation, and installing temporary roads to excavation areas;

- Installation of shoring around the perimeter of the excavation. The shoring will be necessary to prevent collapse of the excavation sidewalls, impacts to the nearby wetlands/floodplain, and damage to nearby structures;

- Excavate approximately 6,000 cubic yards of NAPL and NAPL-impacted soil across the SWP. Manage excavated soils/NAPL on-site based on their level of contamination and then dispose off-site at a licensed facility. Amendments, such as Portland cement, may be added to the excavated soil to meet off-site disposal facility standards, if required. Blend soil at the bottom of the excavation below the water table with an amendment to provide soil and localized groundwater treatment. Backfill excavations with amended soil below the water table and clean soil above the water table, restoring the properties to original grades for no net flood storage loss within the floodplain[20];

- Air monitoring during the excavation and on-site management of excavated materials, as well as monitoring of the adjacent wetlands/waterways, to ensure no contaminant releases impact human health and/or environment during the cleanup activities, as required;

- De-water the portion of the excavation that extends below the water table and any excavated NAPL-contaminated soils that require dewatering, treat the water through a temporary treatment system and discharge the treated water to the Aberjona River (or appropriate off-site disposal at permitted facility, or appropriate approved discharge to the POTW), or appropriate approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property); and,

- Long-term monitoring (as part of the groundwater component of the cleanup) to confirm no further presence of NAPL in groundwater); and

Figure L-2 provides a conceptual layout of the NAPL remedy. The Remedy includes the excavation and off-site disposal of approximately 6,000 cubic yards of NAPL and NAPL-impacted soil in specific areas where NAPL has historically been observed as indicated in **Figure L-2.** The Remedy excavates NAPL and NAPL impacted soils within several portions of the SWP, including the vicinity of monitoring wells MW-7, MW-16, MW-22, MW-23, MW-24, and MW-25 at the Murphy Property and monitoring well WB-201S at the Whitney Property, to approximately 6 feet below the water table (total depth of approximately 12 feet). Excavation will continue in the shallow groundwater until sampling confirms that the excavation goals of removing all the NAPL are met. The conceptual design also includes approximately 795 linear feet of shoring driven to 20 feet below the ground surface to prevent collapse of the excavation sidewalls and impacts to the nearby wetlands/floodplain.

[20] Some NAPL excavation areas may overlap with soil remediation areas were an impermeable cap will be installed over the area at grade.

The excavation will proceed below the water table and require dewatering. Excavated saturated NAPL-contaminated soils will also likely require dewatering prior to off-site disposal. The dewatering water is expected to be treated to appropriate levels prior to proper discharge to the Aberjona River (or appropriate off-site disposal at permitted facility, or appropriate approved discharge to the POTW, or appropriate approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property)). A dewatering system to handle the saturated NAPL-contaminated soils and a temporary groundwater treatment system will be necessary, and may include storage and settling tanks, filtration (*e.g*., bags filters), air stripping to remove VOCs, activated carbon to remove PCBs (as well as VOCs), and ion exchange resins to remove metals. Treated water will be discharged to a nearby surface water body (e.g., Aberjona River) in accordance with ARAR requirements, discharged to the POTW, or sent off-site for treatment and disposal.

The approximately 6,000 cubic yards of NAPL and NAPL-impacted soil will be managed on-site and then transported off-site for disposal at a properly licensed facility. Amendments, such as Portland cement, may be added to the excavated NAPL/soil to meet off-site disposal facility standards, if required. NAPL/soil and all other media generated by the remedial action will be evaluated to determine if it meets the definition of a listed hazardous waste or if it exceeds characteristic hazardous waste standards. Portions may also be Toxic Substance Control Act (TSCA) waste, based upon existing data and pre-design investigations. The excavations will be backfilled with amended soil below the water table and clean soil above the water table. The amendment will be designed to provide soil and localized groundwater treatment similar to the soil remedy on the Whitney Property. Restoration will include returning the area to the pre-existing conditions, and applying seed (native species, to the extent practicable), mulch and/or soil amendments. To the extent that the NAPL removal area overlaps the cap areas delineated under the soil remedy on the Murphy and Whitney Properties, the overlap areas will be capped. The properties will be restored to original grades to prevent flood storage loss within the floodplain.

Note that NAPL removal on the Whitney Property is expected to occur during and as part of the Northern Whitney Soil Area excavations under the soil remedy (See **Figure L-1**). Hence, the NAPL remedy costs are adjusted downward in **Table L-5** to account for NAPL removal under the soil remedy on the Whitney Property.

The selected remedy component for NAPL involves NAPL and associated NAPL-impacted soil excavation at the Whitney and Murphy Properties, and disposal of these excavated materials at an approved off-site disposal facility. Excavation would continue until sampling confirms that the NAPL is completely removed, to the extent practicable.

Under TSCA regulatory standards at 40 C.F.R. §761.61(c), the Region has made a determination that the manner of sampling, storage, cleanup, and disposal of PCB-contaminated NAPL as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment. See TSCA Determination included as **Appendix E** to this ROD.

Groundwater Remediation

The selected remedy component for groundwater, Pump and Treat and Institutional Controls, includes the following components:

- Pre-design investigations to refine the horizontal and vertical extents of groundwater exceeding cleanup levels and to assist in the development of the groundwater treatment system design;
- Sequencing Plan for implementing the Groundwater remedy in a manner that minimizes disruptions to on-going business operations, to the extent practical;
- Optimal location for a groundwater treatment facility;
- Design and construction of the groundwater treatment and monitoring system, including any measures to address stormwater and wetlands/floodplain mitigation issues;
- Operation and maintenance of the groundwater treatment system to prevent contaminant migration and remove groundwater contaminants[21];
- Testing and off-site disposal of any contaminated media generated from the treatment system or from monitoring to a disposal facility licensed to accept the contaminated media; and,
- Long-term Monitoring of groundwater to evaluate effectiveness of pump and treat system and operation and maintenance of the monitoring well system. The effectiveness of the remedy would be evaluated by sampling groundwater monitoring wells until cleanup levels are achieved.

Figure L-3 provides a conceptual layout of the groundwater remedy. The groundwater remedy includes: 1) pre-design investigation activities and groundwater sampling to assist in groundwater treatment system design, which may include treatment components such as bag filters, activated carbon vessels, metals polishing vessels, air strippers, vapor phase activated carbon, *etc*., and to determine the pumping rates, locations and depth of extraction wells; 2) water treatment plant design, and development of health and safety plan; 3) construction of the groundwater pump and treat system, including the treatment plant and treatment components, trenching of associated piping to transfer water to the treatment plant, and discharge piping for discharge of treated water; 4) operation and maintenance of the treatment system components to reduce contaminant concentrations and achieve groundwater cleanup standards, and prevent contaminant groundwater migration into the wetlands or beyond the SWP; 5) long-term groundwater monitoring to determine long-term effectiveness of pump and treat system; 6) operation and maintenance of the monitoring well system, and 7) implementation of Institutional Controls to prevent disturbance of the components of the remedy, prohibit the use of groundwater until cleanup levels are met, and to require evaluation of the vapor intrusion

[21] Additional groundwater treatment will occur through the use of treatment amendments mixed into saturated subsurface soil as part of the soil and NAPL components of the remedy, discussed above.

pathway if a change in usage of any of the existing buildings is contemplated or as part of new building construction, including any addition to existing buildings on any of the properties. Pre-design investigation activities will include consideration of the age and upgrades to the adjacent Wildwood Source Area Property groundwater treatment system plant to accommodate and adequately treat extracted groundwater from the SWP in lieu of constructing a groundwater treatment plant on the SWP (while continuing to treat extracted water from the Wildwood Source Area Property). Cleanup levels for groundwater are shown in **Table L-1 (see Appendix B)**.

Under TSCA regulatory standards at 40 C.F.R. §761.61(c), the Region has made a determination that the manner of sampling, extraction, treatment, and disposal of PCB-contaminated groundwater and treatment media as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment. See TSCA Determination included as **Appendix E** to this ROD.

Wetland Sediment/Soil Remediation

The selected remedy component for the wetland sediment/soil, Deep Excavation, Off-Site Disposal, Backfill Cover, and Wetland Restoration, includes the following components:

- Pre-design investigation to refine the vertical and horizontal extent of wetland sediment/soil exceeding cleanup levels;
- Sequencing Plan for implementing the NAPL remedy in a manner that minimizes disruptions to on-going business operations, to the extent practical;
- Installing any wetland/floodplain mitigation measures that may be required, establishing stormwater/erosion control measures, clearing and grubbing of excavation areas, installing temporary roads to excavation areas, and pre- and post-excavation land surveying;
- Site preparation; establishing a sediment/soil dewatering area; de-watering both the excavation, as required, and any excavated contaminated sediments/soils that require dewatering; water treatment through a temporary de-watering and treatment system; and discharge to the Aberjona River or appropriate approved POTW, or disposal at an appropriate off-site permitted disposal facility, or appropriate approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property);
- Excavate approximately 7,000 cubic yards of wetland sediment/soil exceeding cleanup levels (approximately 63,000 square feet of wetland area). Perform confirmation sampling to demonstrate compliance with cleanup levels. Manage excavated sediments/soils on-site based on their level of contamination. Add amendments, if required, to dewatered sediment/soil to allow off-site disposal. Dispose of dewatered sediment/soil and any treatment media at a licensed off-site disposal facility;

- Backfill excavations to pre-remediation grades with clean wetland soil, and restore the wetland habitat, also restore any altered floodplain habitat, as required;
- Air monitoring during the excavation/backfilling, as well as monitoring of the adjacent wetlands/waterways, to ensure no contaminant releases impact human health and/or the environment during the cleanup activities, as required; and,
- Post-remediation monitoring of plantings and ground surfaces to ensure floodplain/wetland restoration goals are met.

Figure L-4 provides a conceptual layout of the wetland sediment/soil remedy, and illustrates the location of Wetland Sediments (identified within the Murphy Wetland as "SEASONALLY PONDED AREA") and the location of Wetland Soils (identified within the Murphy Wetland as "FORESTED/SCRUB-SHRUB SWAMP"). The wetland sediment/soil remedy includes the excavation and off-site disposal of approximately 7,000 cubic yards of contaminated wetland sediment/soil. The wetland sediment/soil remedy includes excavation to remove all wetland sediment/soil with contaminants in excess of the wetland sediment/soil cleanup levels. Deeper or shallower excavations may be conducted in specific areas of the wetland, depending on pre-design sampling results. Confirmation sampling will be performed to demonstrate compliance with excavation goals. The wetland sediment/soil remedy includes backfilling the excavation to pre-remediation grades and includes restoration of the floodplain/wetland habitat.

As the excavation proceeds below the water table it will be necessary to dewater the excavation. Extracted water is expected to contain PCBs, SVOCs, VOCs, and metals. A temporary dewatering system will be designed and implemented to treat extracted water prior to proper discharge and may include storage tanks, filtration, air stripper, activated carbon, ion exchange resins, *etc*. Treated water will be discharged to a nearby surface water body (*e.g*., Aberjona River) or appropriate off-site disposal at permitted facility, or appropriate approved discharge to the POTW, or appropriate approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property)).

The approximately 7,000 cubic yards of contaminated sediment/soil excavated will be transferred off-site for disposal at a properly licensed facility. Excavated sediments/soils will be managed on-site based on their level of contamination. Additional amendments, if required, will be added to dewatered sediment/soil to allow off-site disposal. The excavations will be backfilled with clean wetland soil to pre-remediation grades. Floodplain/wetland restoration will include planting of native species to restore the disturbed areas. Wetland/floodplain species would be planted in accordance with the restoration plan. The wetland and any altered floodplain will be restored to original grades to prevent flood storage loss. Plantings and visible ground surfaces will be inspected and maintained as required by the restoration plan and ARARs requirements. The monitoring period is assumed to be at least three years. Cleanup levels for wetland sediments/soils are shown in **Tables L-3 and L-4 (see Appendix B)**.

Under TSCA regulatory standards at 40 C.F.R. §761.61(c), the Region has made a determination that that manner of sampling, storage, cleanup, and disposal of PCB-contaminated wetland sediment/soil as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment. See TSCA Determination included as **Appendix E** to this ROD.

Remedy Modifications

The selected remedy may change somewhat as a result of the remedial design and construction process. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the SWP, an Explanation of Significant Differences or a Record of Decision Amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

Table L-5 in **Appendix B** list a summary of the major capital and O&M cost elements for the selected remedy. These tables present the major construction and O&M activities required to implement each remedy component along with their associated unit and total costs. Note that NAPL removal on the Whitney Property is expected to occur during and as part of the Northern Whitney Soil Area excavations under the SW-3 Alternative. Hence, the N-3 Alternative costs are adjusted downward in **Table L-5** to account for NAPL removal under the SW-3 Alternative.

The information in the cost estimate summary tables is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

The total estimated cost of the Selected Remedy is $19.1 million.

4. Expected Outcomes of the Selected Remedy

The primary expected outcome of the selected remedy is that the soils underlying the SWP will no longer present an unacceptable risk to human health via direct contact for a recreational scenario, and will no longer act as a source of groundwater contamination after the remedy is put into place, and no longer act as a source of surface contaminant migration to the wetland. Wetland sediment/soil in the Murphy Wetland will no longer present risks to human health or the environment following completion of the remedial action. In addition, NAPL will no longer serve as a continuing source of impacts to the aquifer, and no longer act as a source of surface contaminant migration to the wetland. Groundwater contamination underlying the SWP will be treated and contained once the extraction/treatment system is put into place. The groundwater is expected to be restored to its permissible, beneficial use as a future potential drinking water source within approximately 20 years and will no longer present an unacceptable risk to human health. It is anticipated that the selected remedy will also provide socio-economic and community revitalization impacts such as increased property values, increased tax revenues due to redevelopment, and enhanced human uses of ecological resources.

The effectiveness of the groundwater remedy will be determined based upon attainment of the cleanup levels outlined in **Table L-1,** as well as any additional site-related COCs added through subsequent decision documents. A monitoring program will be implemented in order to evaluate remedy performance and progress towards attainment. The details of the monitoring program will be established during the remedial design phase and will include the preparation of a long-term monitoring plan, but initial monitoring is expected to include evaluation of all site-related contaminants such as VOCs, SVOCs, metals, pesticides and PCBs. Monitoring scope and frequency could change over time based on technical analysis of the remedy, optimization studies, revised conceptual site model, or other information, as determined by EPA.

The determination that all cleanup levels have been met will consider historical and current monitoring data, contaminant distribution, trend analysis, and the appropriateness of the compliance monitoring program (*i.e.*, locations, frequency of monitoring, sampling parameters). After all groundwater, soil, and wetland sediment/soil cleanup levels (as shown in **Tables L-1** to **L-4**) have been met, EPA will perform a risk evaluation which considers additive risk from remaining COCs considering all potential routes of exposure to document the residual risk based on exposure to soil, wetland sediment/soil, and/or groundwater at the SWP. The residual risk evaluation will document the potential risk associated with the concentrations of the COCs remaining in soil, wetland sediment/soil, and/or groundwater at the SWP (if detected).

a. Cleanup Levels

Cleanup levels were developed for the COCs identified in the human health and ecological risk assessments. COCs are the chemicals found at the SWP that, based on the results of the risk assessment, were determined to pose an incremental lifetime cancer risk greater than 1 in 1 million (10^{-6}) or an HI greater than 1. COCs were identified for exposure areas that posed A) a cancer risk in excess of an Incremental Lifetime Cancer Risk (ILCR) of 10^{-4}, B) an HI greater than 1, or C) a significant ecological risk. Although the PCB TEQ was identified as a COC in groundwater, soil and wetland sediment/soil, cleanup levels have not been developed for the PCB TEQ because the medium-specific cleanup levels for total PCB have been determined to be protective of risk associated with dioxin-like PCBs (see Appendix C in the FS for a complete discussion).

1. Groundwater Cleanup Levels

The cleanup levels for most Chemicals of Concern (COCs) in groundwater were selected based on federal MCLs, or risk-based cleanup goals. For those COCs that do not have a federal or state ARAR at the time this ROD was developed, a risk-based cleanup level was calculated. If a value described by any of the methods described above was not capable of being detected with good precision and accuracy, or was below what was deemed to be the background value, then the practical quantification limit or background value was selected as the cleanup level. The selected cleanup levels are shown in **Table L-1** (see **Appendix B** as well as Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum for cleanup level development). Many of these cleanup levels represent federal MCLs, but some are based on a cancer risk level of 1 x 10^{-6} or an

HQ of 1 (risk-based cleanup level).

The cleanup levels are based on a residential scenario with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways. Risk-based PRG development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1. Based on EPA revisions to default exposure parameters and toxicity values since the release of the FS, Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum contains updated cleanup level development.

The human health risk-based PRGs provided in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. For each of the contaminants, risk-based PRGs were calculated using equations and exposure assumptions initially presented in Appendix C of the FS, which were the same as those used in the baseline HHRA except as noted in the following paragraphs. Toxicity values used in the calculation of the risk-based PRGs are presented in Section G of this ROD.

As noted in Section G of this ROD, the baseline HHRA was completed in early 2014. After the completion of the baseline HHRA, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. These updated standard default exposure factors have been utilized to develop the risk-based cleanup levels for groundwater (see Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum).

The human health risk-based PRG selection process for each contaminant is summarized in Appendix C of the FS and in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum.

Consistent with EPA's 1996 Final Ground Water Use and Value Determination Guidance, and the Commonwealth of Massachusetts' Comprehensive State Groundwater Protection Program (CSGWPP), MassDEP has developed a "Use and Value Determination" of the groundwater relative to the Wells G&H Site. The purpose of the Use and Value Determination is to identify whether the aquifer at the Site should be considered of "High," "Medium," or "Low" use and value. In the development of its Determination, MassDEP applied the criteria for groundwater classification as promulgated in the MCP. The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance. MassDEP determined that there is a Medium use and value for the Site area groundwater. Therefore, EPA has selected cleanup levels based on federal and state drinking water standards, or Maximum Contamination Levels (MCLs), and risk-based criteria that support this use as a future potential drinking water source.[22]

2. Soil Cleanup Levels

Human health-based soil cleanup levels were initially developed in Appendix C of the FS (AECOM, 2016) for a recreational user exposure scenario, based on risks presented earlier in Section G of this ROD for the Murphy and Whitney Properties. EPA has determined that cleanup levels will be established which allow for recreational use of the SWP. While there was also unacceptable risk calculated for a future trespasser exposed to soil at the Whitney Property, the recreational user scenario is the more conservative scenario which results in lower cleanup levels. Similar to groundwater, Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum presents revised cleanup level development information.

Cleanup levels for chemicals of concern (COCs) in surface or subsurface soil exhibiting an unacceptable cancer or non-cancer risk have been established such that they are protective of human health. In the FS and 2017 FS Report Addendum, PRGs were developed for soil associated with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion and dermal contact exposure pathways in a recreational exposure scenario. For those soils, risk-based PRG development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1 (see Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum and Appendix C of the FS). These contaminants include TCE, vinyl chloride, bis(2-ethylhexyl)phthalate, PCBs, pesticides, arsenic, and hexavalent chromium at the Whitney Property and thallium at the Murphy Property.

The human health risk-based PRGs provided in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. The risk-based PRGs are applicable to soils up to a depth of 15 feet below ground surface at the Whitney and Murphy Properties. For each of the contaminants, risk-based PRGs were calculated using equations and exposure assumptions presented in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum. Toxicity values used in the calculation of the risk-based PRGs are presented in Section G of this ROD, while Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum presents the dermal absorption factors used during PRG development. An oral relative bioavailability factor of 0.6 is now recommended by EPA for evaluation of risks and calculation of PRGs for arsenic in soil. The bioavailability factor was not used in the baseline HHRA, but has been applied during PRG development.

As noted in Section G of this ROD, the baseline HHRA was completed in early 2014. Subsequently, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. These updated standard default

[22] The risk associated with the MCLs for ethylbenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, heptachlor, heptachlor epoxide, arsenic and vinyl chloride fall outside (above) the Superfund risk range; however, EPA has determined that MCLs are protective values for drinking water.

exposure factors have been utilized to develop the risk-based cleanup levels for soil (see Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum), along with the revised toxicity values, as discussed in Section G of this ROD.

The human health risk-based soil cleanup levels for each contaminant are summarized in **Table L-2** in **Appendix B** of this ROD. The cleanup levels are selected by considering the ARARs, risk-based PRGs, leaching PRGs, quantitation limits, and reference/background data.

Risk-based cleanup levels for soil correspond to a cancer risk level of 1×10^{-6} for TCE, vinyl chloride, bis(2-ethylhexyl)phthalate and pesticides, a cancer risk level of 1×10^{-5} for arsenic and hexavalent chromium, and a noncarcinogenic HQ of 1 for total PCBs and thallium. See also the TSCA determination in **Appendix E** of this ROD and EPA policy (Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01, EPA/540/G-90/007, August 1990) for further information. Per CERCLA and the NCP, EPA does not require cleanup to below background levels. Therefore, cleanup levels for the arsenic and hexavalent chromium are set at a 1×10^{-5} cancer risk level so the cleanup levels are not below a background levels.

These risk-based cleanup levels must be met at the completion of the remedial action in surface and subsurface soils (to a depth up to 15 feet below ground surface) at the Murphy Property for thallium, and for all other compounds with risk-based cleanup levels at the Whitney Property. These soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

Available data developed in the RI and the baseline HHRA suggest that volatile organic compounds and petroleum hydrocarbon fractions in area soils leach to groundwater thereby contaminating groundwater. This phenomenon may result in an unacceptable risk to those who use contaminated groundwater in the future as a source of potable water. Therefore, cleanup levels for VOCs and petroleum hydrocarbon fractions in soils were also established to protect the aquifer from potential soil leachate. These leachability soil cleanup levels presented on **Table L-2** are applicable to soils located above the water table on the Murphy, Whitney and Aberjona Properties.

The partitioning model used to develop the Soil Screening Levels (SSLs) presented on EPA's RSL May 2016 tables was used to estimate residual soil levels that are not expected to impair future groundwater quality. Appendix C of the 2016 FS describes the development of the leachability cleanup levels. The cleanup levels for groundwater were identified as described in Section L.1 (Groundwater Cleanup Levels). The SSLs listed on the RSL table were adjusted upward 10-fold, consistent with the assumed dilution attenuation factor of 10 applicable to the SWP, rather than the default value of 1 used to develop the default SSLs on the RSL table. The leaching model was arranged such that the model output was consistent with the Cleanup Levels for groundwater. If the predicted protective soil level was not capable of being detected with good precision and accuracy, then the practical quantification limit was selected as the cleanup level for soils.

Table L-2 summarizes the leachability soil cleanup levels established to protect public health and the aquifer and were developed for soil contaminants that have the potential to leach.

These leachability cleanup levels must be achieved at the completion of the remedial action for soils above the water table at the Murphy, Whitney and Aberjona Properties. These soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

3. Wetland Sediment/Soil Cleanup Levels

Human Health

Wetland sediment/soil cleanup levels were initially developed in the FS (AECOM, 2016) for a recreational user exposed to PCBs, C11-C22 aromatic hydrocarbons and lead at the Murphy Wetland. While there was also unacceptable risk calculated for a trespasser due to PCBs, the recreational visitor scenario is the more conservative scenario which results in lower cleanup levels. Similar to groundwater and soil, Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum presents revised cleanup level development information.

The cleanup level for PCBs and C11-C22 aromatics in wetland sediment/soil have been established such that they are protective of human health. Risk-based PRGs were developed for wetland sediment/soil associated with a potential future target organ HI greater than 1 considering the ingestion and dermal contact exposure pathways in a recreational user exposure scenario.

The human health risk-based PRGs provided in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. Risk-based PRGs were calculated using equations and exposure assumptions presented in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum. Toxicity values used in the calculation of the risk-based PRGs are presented in Section G of this ROD, while the dermal absorption factors used during PRG development are presented in Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum.

As noted in Section G of this ROD, the baseline HHRA was completed in early 2014. Subsequently, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. These updated standard default exposure factors have been utilized to develop the risk-based cleanup levels for wetland sediment/soil (see Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum).

The human health risk-based wetland sediment/soil cleanup levels are summarized in **Table L-3** in **Appendix B** of this ROD. The cleanup levels are selected by considering the ARARs, risk-based PRGs, quantitation limits, and reference/background data.

The human health-based cleanup level for PCBs and the C11-C22 aromatic fraction in wetland sediment/soil correspond to an HQ of 1. See also the TSCA determination in **Appendix E** of this ROD and EPA policy (Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01, EPA/540/G-90/007, August 1990) for further information. For lead, the Integrated Exposure and Uptake Biokinetic (IEUBK) model was used to develop a cleanup level applicable for young children less than 7 years of age as the most sensitive receptor group. The lead cleanup level is protective of 95% of the sensitive population against blood lead levels in excess of 5 ug/dl blood. See Attachment 2 of the 2017 FS Report Addendum – Technical Memorandum for further details concerning the model assumptions applied for the lead modeling.

These cleanup levels must be achieved at the completion of the remedial action in wetland sediment/soil in the Murphy Wetland. These wetland sediment/soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

<u>Ecological</u>

The results of the ecological risk assessment indicated that there are potential risks to the benthic community in the Seasonally Ponded Area and to mammals foraging in both the Seasonally Ponded Area and Forested/Shrub Wetland. Risks were determined to be primarily associated with sediment/surface soil concentrations of PCB aroclors and chromium while lead, and to a lesser extent, zinc also present risk to benthic invertebrates within the Seasonally Ponded Area. Consequently, these four constituents were identified as COECs in the Seasonally Ponded Area sediment and/or Forested/Shrub Wetland surface soil.

PRGs for sediment in the Seasonally Ponded Area were derived by identifying 'probable effect' COEC concentrations and background COEC concentrations. The 'probable effect' concentrations were identified as the COEC concentrations reported in the literature to result in significant toxicity to benthic invertebrates while background levels were based on mean concentrations of COECs detected in the reference wetland. In addition, for the mammalian receptors (muskrat and shrew), the selected cleanup levels were calculated as the geometric mean of the 'no effect' and 'low effect' values. Ecological cleanup levels for sediment and surface soil are presented in **Table L-4** in **Appendix B** of this ROD. Documentation of the ecological PRGs is provided in Appendix C of the FS (AECOM, 2016).

These cleanup levels must be met at the completion of the remedial action in sediment in the Seasonally Ponded Area and in surface soil for the Forested/Shrub Wetland. These wetland sediment/surface soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the SWP is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost effective. In addition, the selected remedy utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and partially satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element.

1. The Selected Remedy is Protective of Human Health and the Environment

The remedy at the SWP will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through treatment, engineering controls and Institutional Controls. More specifically, for the soil component of the remedy, excavation of principal threat waste material in the Northern Whitney Soil Area, and the blending of remaining contaminated soil below the water table with an amendment prior to backfilling to provide soil and localized groundwater treatment will be protective of human health and the environment through prevention of precipitation infiltration into the groundwater and prevention of direct contact with soils. The soil component of this remedy also includes impermeable caps over soils exceeding the soil cleanup levels on the Whitney, Murphy and Aberjona Properties to reduce soil exposure risks and/or prevent contaminant movement to groundwater or to the wetlands at concentrations that exceed ARARs and/or risk-based standards. Within the 500-year floodplain of the SWP the caps will be installed below the surface soil level so there is no loss of flood storage capacity. Excavation and off-site disposal of Northern Whitney Soil Area soils that generally cannot be reliably contained will prevent direct contact with soils, prevent erosion and runoff of hazardous waste/contaminated soils, and prevent precipitation infiltration into the groundwater. Excavation and off-site disposal of areas where PCB-contaminated soil exists over the cleanup level will meet TSCA requirements for disposal of PCB remediation waste. Institutional Controls to maintain the integrity of the soil caps and other remedial components; prevent development of the properties for residential, school, and daycare use (exclusive of the existing residence at the Aberjona Property); to prohibit use of contaminated groundwater until cleanup levels are met; and to require evaluation of the vapor intrusion pathway if a change in usage of any of the existing buildings is contemplated or as part of new building construction, including any addition/alteration to existing buildings on any of the properties. To facilitate future use and redevelopment of the SWP consistent with the cleanup, Institutional Controls will be established to preserve the remedy, and appropriately manage impacted soil and groundwater encountered during future intrusive activities (*e.g.* installing subsurface utilities, building foundations/slabs, *etc*.).

For the NAPL component of the remedy, excavation of principal threat waste material in the NAPL areas on the Whitney and Murphy Properties and the blending of soil at the bottom of the excavation below the water table with an amendment to provide soil and localized groundwater treatment will be protective of human health and the environment through prevention of precipitation infiltration into the groundwater and discharge to the Murphy Wetland. Excavation and off-site disposal of NAPL, to the extent practicable, will prevent direct contact with NAPL that contribute to exceedances of groundwater and/or soil ARAR and risk-based standards and prevent precipitation infiltration into the groundwater and discharge to the wetland area. Institutional Controls for soil and groundwater will prevent exposure to any NAPL present in those media after the NAPL excavation and off-site disposal.

Permanent removal of all contaminated wetland sediment/soil from the Murphy Wetland exceeding cleanup levels will reduce the threat of human exposure to contaminants via direct contact and will also reduce risks to ecological receptors from wetland sediment/soil contact to levels protective of the benthic invertebrate population and insectivorous mammals. The excavation and removal of all COCs above cleanup levels present in wetland sediments/soils will provide overall protection to human health and the environment by quickly reducing human health and ecological risks to acceptable levels. Institutional Controls are not required for the wetland sediment/soil component of this remedy.

The groundwater component of the remedy will reduce exposure levels to protective ARAR levels or, in the absence of protective ARAR levels, to within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} for carcinogenic risk and below the HI of 1 for noncarcinogens in groundwater as outlined in **Table L-1** (Groundwater Cleanup Levels) for the purposes of this CERCLA remediation. It should be noted that the groundwater remediation at the SWP addresses contamination related to the SWP only. Institutional Controls are required to prohibit use of contaminated groundwater until cleanup levels are met and require the evaluation of vapor intrusion risks if a change in usage of any of the existing buildings is contemplated or as part of new building construction, including any addition/alteration to existing buildings on any of the properties. Use of a vapor barrier or subslab system may be appropriate to mitigate the vapor intrusion pathway in instances of future development/construction of new or occupied buildings.

The selected remedy will reduce potential human health risk levels such that they do not exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} for incremental carcinogenic risk and such that the non-carcinogenic hazard is below the HI of 1. It will reduce potential human health risk levels to protective ARARs levels (*i.e*., the remedy will comply with ARARs and risk-based standards derived using TBC criteria). In addition, unacceptable ecological risks associated with exposure to wetland sediment/soil will be eliminated by permanent removal of impacted wetland sediment/soil and wetland restoration. Implementation of the selected remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

2. The Selected Remedy Complies with ARARs

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the Site. A detailed list of ARARs/To Be Considered requirements for the selected remedy is included in Appendix **D** of this ROD. A discussion of the more significant ARAR issues is included below.

Wetland Impacts

The cleanup plan selected by EPA includes activities that would impact wetlands. Before EPA selected a cleanup plan that will impact wetlands, Section 404 of the Clean Water Act, regulatory requirements at 44 C.F.R. Part 9, and Executive Order 11990 (Protection of Wetlands) required EPA to make a determination that there is no practicable alternative to conducting work that will impact wetlands and that the selected remedy is the LEDPA under the federal Clean Water Act. EPA has determined that because significant levels of contamination exist in wetlands within the SWP cleanup areas, there is no practicable alternative to permanently removing the contaminants from these wetlands. EPA has determined that the cleanup activities that impact wetlands are the LEDPA because they will permanently remove contaminants that are impairing the wetlands and that any wetland resources altered by the cleanup will be restored to the original grade and with native vegetation.

EPA will minimize potential harm and avoid adverse impacts on wetland resources, to the extent practical, by using best management practices to minimize harmful impacts on the wetlands, wildlife or habitat. Wetlands will be restored and/or replicated consistent with the requirements of federal and state wetlands protection laws.

Floodplain Impacts

The cleanup plan selected by EPA includes activities that result in the occupancy and modification of the 500-year floodplain. Before EPA selected a cleanup plan, regulatory requirements at 44 C.F.R. Part 9 and Executive Order 11988 (Floodplain Management) required EPA to make a determination that there is no practicable alternative to altering floodplain resources. EPA has determined there is no practicable alternative to occupancy and modification of the Aberjona River floodplain. EPA will avoid or minimize potential harmful temporary and permanent impacts on floodplain resources within the 500-year floodplain, to the extent practical, within the cleanup areas including the Murphy Wetland. In addition, the cleanup plan selected by EPA includes provisions for no net flood storage loss (*e.g.*, soil removed prior to cap installation so no net flood storage loss, sediments removed and clean wetland soils backfilled to original grades, etc.).

TSCA Requirements

Management of PCB-contaminated sediments and soils at the SWP must comply with 40 C.F.R.

Part 761 of TSCA. EPA has determined that the risk-based PCB cleanup levels of 5.3 milligrams/kilogram for PCBs for recreational exposure in soil, 1.9 milligram/kilogram for PCBs for ecological exposure in contaminated wetland sediment, and 1.3 milligram/kilogram for PCBs for ecological exposure in contaminated wetland soil at the SWP will not pose an unreasonable risk of injury to health or the environment. Risks from unrestricted exposure to PCBs between 1 milligram/kilogram and 5.3 milligrams/kilogram for PCBs in contaminated soil will be addressed by Institutional Controls that will prevent residential, school, and daycare development (throughout the SWP except within the existing residential area within the Aberjona parcel and in the Murphy Wetland where no residential exposure is anticipated). The soil excavation component of the cleanup plan will remove PCBs greater than or equal to 50 milligrams/kilogram of PCBs in soil, with disposal off-site at a licensed facility. Remaining PCB-contaminated soil above the PCB soil cleanup level will be capped with an impermeable cap to prevent exposure and contaminant migration. In addition, PCB-contaminated NAPL will be removed from the subsurface to the extent practicable. NAPL contaminated with equal or greater than 50 milligrams/kilogram of PCBs will be disposed of at a licensed TSCA or RCRA compliant disposal facility. Excavated soils with PCB-contaminated soils with less than 500 milligrams/kilogram and 1 milligram/kilogram will be disposed of at an appropriated licensed off-site disposal facility. The wetland sediment/soil excavation component of the cleanup plan will remove PCBs greater than or equal to 50 milligrams/kilogram of PCBs in soil, with disposal off-site at a TSCA or RCRA licensed facility. Remaining wetland sediment/soil contaminated with PCBs will be excavated from the wetland until wetland sediment/soil cleanup levels are achieved and disposed of at an appropriately licensed off-site disposal facility. PCBs found in groundwater above cleanup levels will be removed by the pump and treat system, separated from the discharge water, and disposed of off-site at a licensed facility. Consistent with Section 761.61(c) of TSCA, EPA has determined that the management and disposal of PCB contaminated material as described in the Administrative Record for this cleanup plan does not result in an unreasonable risk of injury to human health or the environment as long as certain conditions are met (see Appendix E).

3. The Selected Remedy is Cost-Effective

In EPA's judgment, the selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 C.F.R. 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (*i.e.*, that are protective of human health and the environment and comply with all federal and any more stringent state ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria - long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

The selected remedy is more cost-effective than the other active alternatives considered. The active combined soil, NAPL wetland sediment/soil and groundwater alternatives range in cost from $0 to $54.4 million. The range in estimated cost for the four soil alternatives for the Whitney, Murphy and Aberjona Properties is $0 (SW-1: No-Action) to $9.8 million (SW4), $0 (SM-1: No Action) to $11.4 million (SM-4) and $0 (SA-1: No Action) to $0.63 million (SA-4), respectively. The range for the three NAPL alternatives is $0 (N-1: No Action) to $3.4 million (N-3) and the range for the five wetland sediment/soil alternatives is $0 (WTL-1: No Action) to $2.2 million (WTL-5). The range for the six groundwater alternatives is from $0.0 (GW-1: No Action) to $27.0 million (GW-5).

Off-site transport and disposal is an expensive component of the source control alternatives, making soil alternatives SW-4/SM-4/SA-4, NAPL alternative N-3 and Murphy Wetland alternative WTL-5 the most expensive because they require the greatest volume of off-site disposal. Soil Alternatives SW-4/SM-4/SA-4 are $0.22 million to $8.4 million more than the selected SW-3/SM-3/SA-3 remedies. The selected N-3 Alternative is $2.6 million more expensive than the other active NAPL remedy (N-2). The selected WTL-5 Alternative for Murphy Wetland sediments/soil is $1.2 million more than the capping alternative (WTL-3) and $0.3 million more than the targeted excavation alternative (WTL-4).

Although soil Alternatives SW-3/SM-3/SA-3 are comparable to SW-4/SM-4/SA-4 in that these alternatives will both provide a high degree of long-term effectiveness and permanence through soil removal and capping, the SW-4/SM-4/SA-4 Alternatives are more expensive because they involve the excavation and off-site disposal of an additional approximately 31,000 cubic yards of impacted soil. In addition, the SW-4/SM-4/SA-4 alternatives would be more difficult to implement due to the need to excavate, truck and import greater amounts of material and remove greater portions of the existing buildings, resulting in a prolonged disruption to property owners and greater potential for accidents.

Alternatives SW-2/SM-2/SA-2 involves capping and Institutional Controls and are the least expensive alternatives other than no action; however, these alternatives will leave behind significantly contaminated soils in the saturated zone which will continue to impact groundwater and the wetland. Alternatives SW-2/SM-2/SA-2 include minimal soil disturbance and no soils are transported off-site (*e.g.*, less truck traffic, etc.), protecting the community and workers performing the cleanup the most in the short term; however, the SW-2/SM-2/SA-2 may present significant challenges for complying with ARARs, including TSCA, federal and State wetland protection standards; and 44 C.F.R. Part 9, Floodplain Management and Protection of Wetlands, in particular flood storage requirements.

Alternative N-3 is more expensive than the NAPL skimming alternative (N-2) because it involves the excavation and disposal of approximately 6,000 cubic yards of NAPL-contaminated soil from the Murphy and Whitney Properties; however, Alternative N-3 is expected to have the best long-term effectiveness and permanence because the free-draining and residual NAPL will be excavated and disposed off-site. The N-3 Alternative will achieve RAOs in the shortest period of time since NAPL will be excavated and no longer serve as a source of contamination to soil, groundwater, and the wetland. However, Alternative N-3 may be associated with greater short-term risks to workers performing the cleanup than Alternative N-2 due to the required handling of NAPL-impacted materials and more disruption to property owners.

For the Murphy Wetland sediments/soil, Alternative WTL-5 is marginally more expensive than Alternatives WTL-4 because it involves the excavation and disposal of an additional approximately 3,300 cubic yards of impacted wetland sediment/soil; however, the long-term effectiveness and permanence of the WTL-5 alternatives is the highest and no cap or Institutional Controls will be required to manage residually impacted sediment.

Although it is the least expensive alternative, other than No Action, Alternative WTL-2 would not achieve cleanup standards within a reasonable time period compared with the capping/excavation scenarios. Alternative WTL-3 is also less costly than WTL-5; however, it would result in significant filling of wetlands and loss of flood storage capacity with no identified practicable area within the watershed, upstream of sensitive flood receptors, to create replacement wetland/flood storage. In addition, significantly contaminated sediment would remain in place as part of the WTL-3 Alternative. It may be difficult for this alternative to comply with ARARs since areas for wetland and flood storage mitigation within the watershed are extremely limited.

Table K-1 helps demonstrate the cost-effectiveness of the selected soil, NAPL and wetland sediment/soil remedies.

For groundwater, the selected management of migration remedy, GW-6, costs $4.2 million. The GW-4, GW-5 and GW-6 Alternatives are more expensive than the GW-2 (Institutional Controls) and GW-3 (MNA and Institutional Controls) because in addition to Institutional Controls and monitoring, they include active remedial measures.

Alternatives GW-4, GW-5, and GW-6 are all expected to have good long-term effectiveness due to the combination of temporary Institutional Controls and active treatment. Alternative GW-5 includes *In-Situ* Chemical Oxidation and Institutional Controls and is the most expensive by $22.8 million because it includes a pre-design investigation, bench scale testing, pilot testing and the installation of several hundred injection points/wells that will be subject to three rounds of injection. Although the GW-4 Alternative (*In-Situ* Bioremediation and Institutional Controls) also involves aquifer injection activities, this alternative is less expensive as it involves only two rounds of injection. GW-6 includes groundwater extraction and treatment for SWP-wide groundwater and is the less expensive than GW-4 and GW-5 by $2.9 million and $22.8 million, respectively. Alternative GW-6 requires fewer wells than Alternatives GW-4 or GW-5 and is anticipated to have the greatest reduction of toxicity, mobility or volume through treatment. The GW-6 Alternative is also likely to achieve groundwater PRGs more quickly than the other alternatives and to provide containment of the groundwater contamination until cleanup levels are achieved.

See **Table K-1** for the estimated costs for each groundwater alternative.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilized permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

The selected remedy is protective of human health and the environment, uses proven cleanup technologies such as excavation, treatment and disposal, and is cost effective, while achieving the site-specific cleanup objectives in a reasonable timeframe. This cleanup approach provides both short and long-term protection of human health and the environment; attains all applicable or relevant and appropriate federal and state environmental laws and regulations; reduces the toxicity, mobility, and volume of contaminated soil, sediment, and groundwater through treatment, to the maximum extent practicable; utilizes permanent solutions and uses land use restrictions to prevent unacceptable exposures in the future to the contaminants that will remain at the SWP.

Table K-1 demonstrates how the respective selected remedies provide the best balance of trade-offs when compared against the evaluation criteria.

5. The Selected Remedy Partially Satisfies the Preference for Treatment as a Principal Element

The principal elements of the selected remedy are source control and management of migration. These elements address the primary threats at the SWP, contamination within the Northern Whitney Soil Area and the Murphy Property NAPL area, that contain principal threat waste at levels that represent a greater than 10^{-3} risk, and present a source for contamination of groundwater. The selected remedy will permanently remove the Principal Threat Wastes from the SWP and dispose of it off-site at facilities licensed to accept the waste untreated, but does not achieve the statutory preference of treatment for these wastes. Full scale implementation of treatment for the large volume of excavated SWP soils, NAPL and wetland sediments/soils (approximately 30,800 cubic yards) is impracticable. Given technology and space, no practicable means of on-site treatment was identified except for potential measures to add stabilizing agents to the waste prior to shipment to facilitate waste transport and meeting off-site disposal facility requirements. However, the selected remedy will backfill the NAPL and deeper soil excavations with an amendment to provide localized soil and groundwater treatment, and dewatering activities associated with implementing the soils, sediments and NAPL work will provide treatment of water prior to discharge. In addition, the selected remedy for Groundwater will satisfy the statutory preference for treatment. Thus, the overall selected remedy partially satisfies the statutory preference for treatment as a principal element of the remedy.

6. Five-Year Reviews of the Selected Remedy are Required

At the conclusion of the remedy construction, hazardous substances, pollutants or contaminants will remain at the SWP, as is also the case at other Operable Units within the Wells G&H Site. Therefore, as required by law, EPA will review the SWP remedy to assure that the remedial action continues to protect human health and the environment at least once every five years as part of the Agency's five-year reviews for the entire Site. These five-year reviews will evaluate the components of the SWP remedy for as long as contaminated media above CERCLA risk levels remain in place. The next Well G&H Site five-year review (the fifth) is due in 2019.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA presented a proposed plan for remediation of the SWP on July 13, 2017. The major components of the preferred alternative included:

- Excavation and off-site disposal of approximately 5,400 cubic yards of significantly contaminated soil at the designated Northern Whitney Soil Area, and blending remaining contaminated soil below the water table with an amendment prior to backfilling to provide soil and localized groundwater treatment. In addition, excavation and off-site disposal of approximately 12,400 cubic yards of soil to facilitate capping and maintain flood storage, and construction of impermeable caps over the remaining lower concentration soils that exceed cleanup levels to reduce soil exposure risks and/or prevent contaminant movement to groundwater;

- Excavation and off-site disposal of NAPL, including approximately 6,000 cubic yards of NAPL-contaminated soil and the blending any remaining NAPL-contaminated soil below the water table with an amendment prior to backfilling to provide soil and localized groundwater treatment;

- Containment and cleanup of groundwater contaminants by pumping and treating the groundwater;

- Excavation and off-site disposal of approximately 7,000 cubic yards of wetland sediment/soil exceeding cleanup levels and wetland restoration;

- Long-term monitoring; and

- Institutional Controls to maintain the integrity of the soil caps and other remedial components; to prevent development of the properties for residential, school, and daycare use; to prohibit use of contaminated groundwater until cleanup levels are met; and to require evaluation of the vapor intrusion pathway if a change in usage of any of the existing buildings is contemplated or as part of new building construction, including any addition/alteration to existing buildings on any of the properties.

EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the proposed plan, were necessary.

O. STATE ROLE

The Massachusetts Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The Commonwealth has also reviewed the Remedial Investigation, Risk Assessments, Feasibility Study, and FS Report Addendum to determine if the selected remedy is in compliance with applicable or relevant and appropriate state environmental and facility siting laws and regulations. The Commonwealth of Massachusetts concurs with the selected remedy for the SWP, OU-4 of the Wells G&H Superfund Site. A copy of the declaration of concurrence is attached as **Appendix A.**

PART 3 – THE RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION

A. PUBLIC COMMENTS AND EPA RESPONSES

On July 6, 2017, EPA mailed notice of the Proposed Plan to interested parties. On July 11, 2017, notice of the Proposed Plan was published on EPA's web page. On July 12, 2017, EPA issued a press release announcing the Proposed Plan, and on July 14, 2017, EPA published a notice of the availability of the Proposed Plan in the Woburn Daily Times and Boston Globe newspaper. On July 13, 2017, EPA made the administrative record and the Agency's Proposed Plan available for public review at EPA's offices in Boston and at Woburn Public Library. On July 13, 2017**,** EPA also held an informational meeting at Woburn City Hall, City Council Chambers, 10 Common Street, Woburn, MA. From July 14, 2017 to August 14, 2017, EPA held a 30-day public comment period to accept public comment on the alternatives presented in the 2017 Feasibility Study Report Addendum – Technical Memorandum, 2016 Feasibility Study Report, and the Proposed Plan and on any other documents previously released to the public. An extension to the public comment period was requested, and the comment period was extended to September 13, 2017. On August 3, 2017, the Agency held a public hearing at Woburn City Hall, City Council Chambers, 10 Common Street, Woburn, MA, to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included below. Outlined below is a summary of comments received from the public and other interested parties during the public comment period and EPA's response to those comments. Similar comments have been summarized and grouped together. The full text of all written and oral comments received during the comment period has been included in the Administrative Record.

Summary of comments received via email from AECOM on 9/12/17 representing the Beatrice Company:

Proposed Plan

AECOM Comment 1:

EPA's Proposed Cleanup Approach, Groundwater (Pg. 7, last paragraph and Pg. 23, GW-6 Pump and Treat and Institutional Controls (EPA's Preferred Alternative)):
EPA recommends that "pre-design investigation activities may include consideration of upgrades to the adjacent Wildwood Source Area Property groundwater treatment system plant to accommodate and adequately treat extracted groundwater from the SWP in lieu of constructing a

groundwater treatment plant on the SWP". The Wildwood treatment system was designed for groundwater remediation at the Wildwood Property. Given the age of the system and potential liability issues with treatment of groundwater sourced from other properties, it is not considered appropriate to contemplate potential future SWP groundwater treatment at the Wildwood Source Area Property.

EPA Response: While EPA acknowledges the Commenter's concerns about the potential use of the Wildwood Source Area Property (Wildwood SAP) groundwater remediation system for the OU4 remedy, EPA has retained its use as an option in the ROD to maintain remedy flexibility. The issues raised by the Commenter would be addressed at the remedial pre-design phase, in the event the use of the Wildwood SAP groundwater remediation system is retained as a treatment option. As the ROD describes, the SWP, Operable Unit 4, pre-design investigations activities may include consideration of upgrades to the adjacent Wildwood SAP groundwater remediation system to accommodate and adequately treat extracted groundwater from the SWP in lieu of constructing a groundwater treatment plant on the SWP. As part of this process, the pre-design investigation activities will consider the age of the adjacent Wildwood SAP groundwater remediation system and any necessary upgrades to adequately treat extracted groundwater from the SWP (while continuing to treat extracted water from the Wildwood SAP).

AECOM Comment 2:

Background Section, Murphy Wetland (Pg. 13):

The data presented in the RI and FS do not support EPA's comments that the Wildwood Property to the north is a likely source of impacts to the Murphy Wetland (*e.g.*, due to the mixed-contaminated soil impacts that were remediated in 1993-1994). In their FS Report Addendum - Technical Memorandum (July 2017), EPA states that one area at the Wildwood Property near the northwest portion of the wetland (Area 4 identified in the 100-Percent Design Report, Mixed Contaminated Soils [RETEC, 1994]) represents a potential source of impacts to wetland sediments and soils because of the potential for pre-remediation surface erosion and periodic flooding events. The rationale provided by EPA for former soils in Area 4 at Wildwood as a potential contributor of wetland impacts is not supported by the data collected in the wetlands. In summary, EPA identified the location of Area 4 as adjacent to the northwest corner of the wetland. Former Area 4 was adjacent to the northeast corner of the wetland, on the east side of the Wildwood Property access road, and was hydraulically downflow from the Murphy Wetland. Former Area 4 was approximately 400 square feet in area and 30 cubic yards of soil was excavated in the early 1990s. Pre-design sampling results had a maximum PCB concentration of 25 mg/kg and a maximum lead concentration of 683 mg/kg in Area 4. Sediment data collected from the far eastern portion of the Murphy Wetland, closest to Former Area 4, had chromium, lead, and zinc results that were less than the lowest PRGs.

EPA Response: EPA agrees that the location of Area 4 is to the "northeast" of the Murphy Wetland and not to the "northwest" of the Murphy Wetland. EPA disagrees with the Commenter's suggestion that data collected in the wetlands does not support EPA's statements in the 2017 FS Report Addendum. For example, the 2016 RI Report Figure 4-53 illustrates PCB concentrations in the wetland, including north/northeast samples P-33 (PCBs at 7.9 mg/kg) and P-24A (PCBs at 4.9 mg/kg), which exceeds the ROD's cleanup standard for PCBs in wetland soils/sediments. EPA's statement in the FS Report Addendum is further supported by RI Report, Section 6.2 Primary and Secondary Transport Mechanisms, 6.2.4 Physical Processes, which states: "Contaminants in soils can be moved directly via the movement and placement of soils. Overland flow that may occur during flooding may suspend soils or sediment and create a re-distribution of these materials and the associated contaminants. Runoff and erosion processes occurring during weather events, such as rain or wind, may move surficial soils and associated contaminants overland towards lower areas (e.g., the Murphy Wetland). From these processes, soils and sediments not directly part of the operations or release areas may be impacted." (RI, p. 6-4)

The following is the correct text that replaces the errant text in Section 1.3.4 of the FS Report Addendum:

*"**Feasibility Study – Section 1.3.4 – Wetland Sediment/Soil***
As described in the 100-Percent Design Report, Mixed-Contaminated Soils (RETEC, 1994), excavation and remediation of mixed-contaminated soils targeted four distinct areas, including one area (i.e., "Area 4") located near the southern limit of the Wildwood Property and adjacent to the northeast portion of the wetland."

AECOM Comment 3:
Page 9, 3rd bullet:
This bullet discusses site preparation and dewatering and at the end of the bullet states "… water treatment through a temporary de-watering and treatment system; and discharge to the Aberjona River". Change the last portion of this statement to "…and discharge to the Aberjona River or other permitted discharge". Justification: This change will allow the flexibility to evaluate other discharge options, such as to the Publicly Owned Treatment Works, which may be more cost-effective.

EPA Response: EPA agrees with the Commenter that flexibility is desirable with respect to discharge options and has provided greater flexibility in the ROD with respect to dewatering treatment and discharge options for the Soil, NAPL, and Wetland Sediments/Soils components of the ROD remedy. Specifically, the ROD states: "… water treatment through a temporary de-watering and treatment system; and discharge to the Aberjona River or appropriate approved POTW, or disposal at an appropriate off-site permitted disposal facility, or appropriate *approved on-site treatment and discharge from adjacent Operable Unit-1 source area property (Wildwood Source Area Property);" (ROD, Section L)*

AECOM Comment 4:

Page 9, 4th bullet:

Revise this bullet as follows: Add "Excavate to a maximum of three feet. If contaminants are present above the remediation goals deeper than 3 feet, they will be effectively isolated by placement of a three foot cover. Excavation may be terminated at 2 feet if the remaining sediments are not significantly impacted (less than 10X the remedial goals). These sediments with minimal impacts will be effectively isolated by a two foot cover." Delete "Perform confirmation sampling to demonstrate compliance with cleanup levels." Substitute the following: "The approach to verifying that the cleanup objectives are met will be determined by the design engineer as part of the remedial design. Acceptable options include pre-excavation delineation and excavation to target elevation without pit bottom samples, excavation and pit bottom samples, or a combination of these approaches. Achieving the numerical goals is not required in areas where the three foot cover is being installed. The two or three foot cover will effectively isolate any residual impacts to sediments." Justification: The remedial goals selected by EPA are very low and may be similar to background conditions. The above changes are necessary to prevent additional deeper excavation and associated higher remedy costs. Limiting the excavation depth to a maximum of three feet is protective of potential receptors because a three foot cover will be installed, effectively isolating any residual impacts. In a similar way, stopping at 2 feet may be appropriate where the residual levels of contamination are relatively low (less than 10X goals).

EPA Response: EPA does not agree with the Commenter's approach for the Murphy Wetland. EPA's selected remedy removes all contamination above remediation goals so that no long-term monitoring, institutional controls, or five-year reviews are required for the Murphy Wetland. There is no defined depth of excavation, because depth of excavation is solely driven by the presence of contaminated wetland soil/sediment exceeding the remediation goals, so excavations in some areas may be less than three feet. Under the Commenter's proposal to use pre-defined depths of excavation, confirmatory sampling would be needed to determine if subsurface contamination above remediation goals is being left in place requiring a cap/cover, long-term monitoring, institutional controls and five-year reviews. Whether a soil/sediment cover or engineered cap needs to be installed depends on what contaminants are left behind and at what contaminant levels. In particular, if PCBs exceeding TSCA thresholds are left in place in the subsurface below the maximum excavation depth, then a TSCA-compliant cap would be required. The comment also relies on cover/cap integrity to maintain protectiveness, which would necessitate long-term costs for monitoring and maintenance.

The selected remedy will include wetland sediment/soil pre-design sampling to more accurately determine the extent of sediment contamination exceeding remediation goals, remove all wetland *sediment/soil above remediation goals, and provide the higher degree of Long-Term Effectiveness and Permanence. The selected remedy will also include post excavation sampling to confirm the remediation goals have been achieved and ARARs have been satisfactorily met. While the Commenter claims the remediation goals "may be similar to background conditions", the remediation goals for the wetland sediment/soil selected remedy were established at or above background conditions, as is required under CERCLA.*

AECOM Comment 5:
Page 9, 4th bullet:
Requiring post excavation confirmation samples unnecessarily restricts the design process and causes delays during construction. Post-excavation sampling requires the excavation to be left open for at least one day to typically several days. During that period the excavation fills back up with water and thus added costs are incurred due to delays and additional dewatering. Conducting pre-excavation delineation sampling and then excavating to the target depth without post-excavation sampling is an accepted practice that reduces delays and reduces costs.

EPA Response: Post excavation confirmation sampling will demonstrate that all of the wetland sediment/soil above the remediation goals have been adequately removed and that the remedy complies with ARARs and removes all contaminants exceeding risk standards from the Murphy Wetland. Dewatering is a component of the wetland sediment/soil remedy, which is typically accomplished with one mobilization and demobilization. The timing concerns the Commenter expresses in the comment will be addressed during remedial design through efficient sequence planning for wetland sediment/soil excavation and confirmatory sampling. These measures will be used to reduce costs and prevent project delays.

AECOM Comment 6:
Page 9, Paragraph after 8th (last) bullet:
Change "Alternative WTL-5 includes excavation to remove all wetland sediment/soil with contaminants in excess of the wetland sediment/soil cleanup levels. Deeper or shallower excavations may be conducted in specific areas of the wetland, depending on pre-design sampling results. Confirmation sampling will be performed to demonstrate compliance with excavation goals. Alternative WTL-5 includes backfilling the excavation to pre-remediation grades and includes restoration of the floodplain/wetland habitat." To: "Alternative WTL-5 includes excavation to remove wetland sediment/soil with contaminants in excess of the wetland sediment/soil cleanup levels. Shallower excavations may be conducted in specific areas of the wetland, depending on pre-design sampling results. Sediment/soil with residual levels of contaminants (less than 10X the goals) may remain in place but would be covered with a minimum of two feet of cover. Alternative WTL-5 includes backfilling the excavation to pre-remediation grades and includes restoration of the floodplain/wetland habitat." Justification: The

maximum excavation depth should be three feet. Escalating remedy costs for deeper excavation would not provide any significant risk reduction.

EPA Response: See above responses to AECOM Comments 4 and 5.

AECOM Comment 7:
Page 9, last paragraph:
EPA states "Plantings and visible ground surfaces will be inspected and maintained as required by the restoration plan and ARARs requirements. The monitoring period is assumed to be at least three years." Delete the sentence "The monitoring period is assumed to be at least three years." and replace it with "Monitoring will continue until the new wetland vegetation has been established as described in a wetland planting plan. A two year monitoring period is anticipated." Justification: This change will allow greater flexibility to effectively and efficiently monitor the wetlands restoration and control costs that may be unnecessary.

EPA Response: The language proposed by the Commenter does not follow federal wetland mitigation practice in the 2016 US Army Corps of Engineers New England District Compensatory Mitigation Guidance (Corps Mitigation Guidance), which addresses restoration/mitigation under Section 404 of the federal Clean Water Act and its supporting regulations. As described in the Corps Mitigation Guidance, the monitoring of the wetland restoration/mitigation in the shrub/scrub wetland habitat to be altered by the remedial action or where invasive species need to be controlled would typically be conducted, at a minimum, during post-construction years 1, 2, 3, 5, 7, and 10, with maintenance conducted as needed. The specific schedule for the OU4 remedy will be developed as part of the remedial design process, but is expected to follow the Corps Mitigation Guidance standards.

AECOM Comment 8:
Page 16, first full paragraph:
The Proposed Plan presumes that the SWP is a potential future drinking water source. However, if the SWP is a Potential Productive Aquifer (PPA) as mapped by MassGIS and not a drinking water source area as stated in the Proposed Plan, then it is prudent to consider whether the SWP should more appropriately have a Non-Potential Drinking Water Source Area (NPDWSA) designation. Based upon an initial review of the policy considering land use, the SWP may qualify as a NPDWSA. This analysis should be completed in accordance with MassDEP Policy WSC-97-701 (Determining NPDWSAs, dated April 4, 1997) and submitted to MassDEP for final determination. Furthermore, MassDEP is considering regulatory changes (Massachusetts Contingency Plan, 310 CMR 40.0000) regarding the 100-acre criteria defining a NPDWSA that may make this option more feasible for the SWP to meet. If the SWP can be classified as an

NPDWSA, then the proposed groundwater cleanup levels should be modified accordingly. The Proposed Plan should include language contemplating this alternative designation.

EPA Response: In June 2004, MassDEP prepared a Use and Value Determination for the aquifer at the Wells G&H Superfund Site (see the Administrative Record). Under the Use and Value Determination, the State has rated the aquifer with a "Medium" groundwater use and value determination, because of its significant current and future ecological value to the Aberjona River and associated wetlands, and its potential value as a drinking water supply in the future. It also falls within an Interim Wellhead Protection Area. Based upon this determination, future potable use of SWP-wide groundwater by a resident is possible. Because of the Use and Value Determination, the baseline risk assessment needed to consider exposure scenarios for the groundwater risk evaluation, including, but not limited to: ingestion and exposures from other domestic uses; inhalation of vapors from seepage into buildings; use of the water in industrial processes and other potential exposures to the use of the water in industrial and residential activities; worker exposure during excavation into groundwater; and exposures resulting from discharge to surface water." In March 2014, EPA, in consultation with MassDEP, prepared a human health and ecological baseline risk assessment for the Southwest Properties (see Administrative Record), which included exposure to groundwater through ingestion, vapor intrusion, construction work, etc., consistent with the MassDEP June 2004 Use and Value Determination. The State supports EPA's remedy to restore the aquifer to drinking water standards (see Appendix A).

FS Report Addendum

AECOM Comment 9:
Page 2, Remedy Implementation Section: EPA clarifies they expect pre-design investigations (PDI) for groundwater to occur in parallel with PDI for soil and NAPL remedies such that the "groundwater remedy design will overlap with the design and implementation of the soil and NAPL remedies to avoid unnecessary delays with constructing the selected groundwater alternative. EPA expects that construction/implementation of the selected groundwater remedy will commence once the selected NAPL remedy and the selected soil remedy involving the Northern Whitney Soil Area have been implemented." This statement unnecessarily restrains the design engineer and is likely to lead to a poor overall design. There is no technical basis to proceed with design of the groundwater remedy before the benefits of source removal are realized. A more technically sound approach would be to wait 2 to 5 years to better evaluate the effect of soil removal and backfill amendment on remaining groundwater concentrations prior to designing and implementing a groundwater remedy. Designing the pump and treat system before source removal will likely lead to over-design both in terms of the treatment processes and number of extraction wells. As conceptually designed in the FS, the soil excavations down into and below the water table and placement of treatment amendments is a highly effective groundwater remedy. These actions alone will improve groundwater in the local area and,

overtime, in a broader area. Designing and implementing a groundwater pump and treat system before the benefits of source removal are realized is premature. Considering that the groundwater is not currently being used in the area and that there is no evidence that the plume is spreading, monitoring for a set period of time to inform the design and build of the pump and treat system is protective of receptors and recommended.

EPA Response: EPA disagrees with the comment. The selected remedy's use of amendments will not eliminate shallow groundwater contamination where the amendments are applied, and implementation of the selected remedy is necessary to address the remaining contamination in shallow groundwater as well as the deeper groundwater (e.g. intermediate and bedrock groundwater; see 2016 RI Report Figures 3-5 and FS Report Figure 1-7). As noted in the 2016 FS Report, implementation of the soil selected remedy at the Northern Whitney Soil Area (e.g. excavation, backfilling with a ZVI amendment, and placement of a cap) would reduce 90% of the PCB and CVOC contamination in the shallow groundwater (2016 FS Report, p. 5-12). The Northern Whitney Soil Area contains some of the highest PCB and CVOC soil concentrations on the SWP, however, and the remaining 10% of soil contamination would continue to impact groundwater. The soil and NAPL components of the remedy will only directly alter contaminant levels in the shallow groundwater, leaving deeper contamination unaddressed.
The 2016 FS Report, Figure 1-7 Overview of SWP-Wide Groundwater Impacts, illustrates that the shallow and intermediate overburden groundwater zones and the bedrock zones are impacted with contamination requiring groundwater treatment. As illustrated in the 2016 RI Report Figure 3-5, "Geologic Cross Section B-B' and Groundwater Elevation Data" from April 2011, the saturated thickness of the overburden under the southwest properties ranges from 75' to 130', where the shallow overburden zone saturated thickness is 0' – 25' and the intermediate overburden zone saturated thickness is from 25' – 130'. As described in the 2017 FS Report Addendum (p. 20, 215 & 222 of 472, "the soil amendment is focused on reducing VOC concentrations in soil and <u>shallow groundwater,</u>" and "the saturated thickness of the shallow overburden zone of the aquifer is estimated to be about 25 feet." The soil amendment is only being applied to backfill soils in limited areas of the shallow zone (e.g. Northern Whitney Soil Area, and NAPL areas on the Murphy and Whitney Properties, as described the FS Report Addendum and illustrated on Figure 5-2, 5-5 & 5-8 and Figure 5-14), and the contaminated shallow groundwater below and outside of these areas of amendment backfill are not anticipated to be reduced. In addition, the impacted groundwater within the larger intermediate overburden zone saturated thickness (25' – 130') and the saturated bedrock zone will not be reduced.

Regarding the sequencing of the remedial components, the timing of the remedial work will be finalized as part of the remedial design but it is expected that construction/implementation of the groundwater remedy will commence once the selected NAPL remedy and soil remedy involving the Northern Whitney Soil Area have been implemented. The timing of these measures will address contaminated groundwater throughout the SWP to achieve groundwater cleanup within the estimated 20 years described within the 2017 FS Report Addendum.

AECOM Comment 10:
Page 4, Remedy Implementation Section: EPA is requesting that the amendment be selected to treat all VOCs detected in groundwater, both chlorinated and non-chlorinated. This is a restraint on the design engineer and is likely to lead to a less than optimal amendment selection. Non-chlorinated VOC impacts are relatively minor compared to the chlorinated volatile organics (CVOCs) and should continue to degrade naturally. The best treatment reagents for CVOCs are not the same as for non-chlorinated VOCs. In fact, reagents selected for non-chlorinated VOCs can make the CVOC problems worse. The following statement is recommended: "The amendment selection will be determined by the design engineer with a focus on treatment of CVOCs. Simultaneous treatment of non-chlorinated VOCs is desirable but not required."

EPA Response: The Remedial Design process will determine the best amendment(s) to be used to treat contamination left in place in the subsurface soils. As expressed in the Proposed Plan and further expressed in the ROD, the Remedial Design for the selected NAPL remedy and selected soil remedy involving the Northern Whitney Soil Area will include bench-scale testing of soil amendments (e.g. ZVI) for backfill to treat and mitigate localized soil and groundwater contamination. Considering the significant CVOCs concentrations present at the Northern Whitney Soil Area, soil amendments for backfill to treat and mitigate localized soil and groundwater contamination will emphasize reducing chlorinated VOCs.

AECOM Comment 11:
General Clarifications Section, Potential Contribution of Groundwater Impacts to Northeast Corner of SWP from the Adjacent Wildwood Property (Pg. 6):
• EPA believes impacted groundwater originating at Wildwood "could be a past and ongoing contributor of impact to groundwater at the northeast corner of the SWP in the vicinity of the S77 well cluster." The selected alternative in the proposed plan (GW-6) does not include treatment of groundwater from the S77 well cluster area located on the southern portion of Wildwood OU-1 property; therefore, any groundwater treatment that may be required in this area is separate from the groundwater alternative presented in the SWP Proposed Plan.

EPA Response: EPA agrees with the Commenter that the selected alternative does not address contaminated groundwater in the vicinity of the S77 well cluster. The selected remedy addresses groundwater contamination in the area illustrated on Figure 1-7 of the 2016 RI Report within OU4. The S77 well cluster is located in OU1 and any groundwater contamination in that area will be addressed by the OU1 remedy.

AECOM Comment 12:

Section-Specific Clarifications Section, Feasibility Study – Section 1.3.4 – Wetland Sediment/Soil (Pg. 8): The data presented in the RI and FS do not support EPA's comments that the Wildwood Property to the north is a likely source of impacts to the Murphy Wetland (*e.g.*, due to the mixed-contaminated soil impacts that were remediated in 1993-1994). In their FS Report Addendum - Technical Memorandum (July 2017), EPA states that one area at the Wildwood Property near the northwest portion of the wetland (Area 4 identified in the 100-Percent Design Report, Mixed Contaminated Soils [RETEC, 1994]) represents a potential source of impacts to wetland sediments and soils because of the potential for pre-remediation surface erosion and periodic flooding events. The rationale provided by EPA for former soils in Area 4 at Wildwood as a potential contributor of wetland impacts is not supported by the data collected in the wetlands. In summary, EPA identified the location of Area 4 as adjacent to the northwest corner of the wetland. Former Area 4 was adjacent to the northeast corner of the wetland, on the east side of the Wildwood Property access road, and was hydraulically downflow from the Murphy Wetland. Former Area 4 was approximately 400 square feet in area and 30 cubic yards of soil was excavated in the early 1990s. Pre-design sampling results had a maximum PCB concentration of 25 mg/kg and a maximum lead concentration of 683 mg/kg in Area 4. Sediment data collected from the far eastern portion of the Murphy Wetland, closest to Former Area 4, had chromium, lead, and zinc results that were less than the lowest PRGs.

EPA Response: See above response to AECOM Comment 2.

AECOM Comment 13:

Section-Specific Clarifications Section, Alternative GW-6: Pump and Treat with Institutional Controls, Subsection a). (Pg. 36): EPA states that "Alternative GW-6 shall also consider potential coordination with the adjacent Wildwood Property for upgrading their existing groundwater treatment system to potentially receive GW-6 contaminated groundwater extracted from the SWP for treatment." The Wildwood treatment system was designed for groundwater remediation at the Wildwood Property. Given the age of the system and potential liability issues with treatment of groundwater sourced from other properties, it is not considered appropriate to contemplate potential future SWP groundwater treatment at the Wildwood Source Area Property. Furthermore, considering the Proposed Plan ill-advisedly contemplates designing the groundwater remedy prior to evaluating the benefits from source removal and/or remedial amendment placement below the water table, this suggestion exacerbates the risk of over-design of the contemplated upgrades to the Wildwood treatment system, rendering this option impractical, infeasible, and arbitrary.

EPA Response: See above response to AECOM Comment 1.

AECOM Comment 14:

Section-Specific Clarifications Section, Alternative WTL-5: Deep (3 ft) Excavation and Off-Site Disposal, Backfill, and Wetland Restoration, Subsection a). (Pg. 42):
• EPA states that all sediment/soil above the PRGs will be removed. This is an unnecessary requirement because a three foot cap is being installed. The PRGs are very low and in many cases near background levels. Escalating remedy costs for deeper excavation below 3 feet would not provide any significant risk reduction.

EPA Response: See above response to AECOM Comment 4.

AECOM Comment 15:
Section-Specific Clarifications Section, Alternative WTL-5: Deep (3 ft) Excavation and Off-Site Disposal, Backfill, and Wetland Restoration, Subsection a). (Pg. 42):
EPA is requiring confirmation samples but in this context it does not specify if they are pre-excavation or post-excavation. We suggest they add "(confirmation samples may be collected before or after excavation)."

EPA Response: EPA clarifies that the confirmation sampling to demonstrate compliance for the selected remedy refers to post-excavation compliance sampling.

AECOM Comment 16:
Section-Specific Clarifications Section, Alternative WTL-5: Deep (3 ft) Excavation and Off-Site Disposal, Backfill, and Wetland Restoration, Subsection a). (Pg. 42):
Excavation should be limited to a maximum of three feet unless deeper sediments are "significantly impacted" (10X remedial goals).

EPA Response: See above responses to AECOM Comments 4 and 5.

Summary of comments received from S&J Property Management delivered by hand 8/17/17

S&J Property Management Comment 1:
Is there funding or some type of payment plan for this project?

EPA Response: In May 2014, EPA notified 16 parties of their potential liability at the Southwest Properties. Since then, EPA continues to pursue evidence on parties that may have *liability at the Southwest Properties. The purpose of the notifications and continued pursuit of potentially liable parties is to ultimately reach a settlement with those parties to implement or fund the selected remedy at the Southwest Properties.*

S&J Property Management Comment 2:
How much is the Whitney [Property] owners responsible for?

EPA Response: The estimated total cost for the selected remedy is $19.1 million. Under CERCLA there is joint and severable liability, which means that each responsible party is equally liable for all remedy costs. It is not EPA's role under CERCLA or the NCP to allocate the costs of the selected remedy between different responsible parties. Please see above response to S&G Property Management Comment 1.

S&J Property Management Comment 3:
Can you please give a better time of start and finish? [This property is the sole source of income at this time for the Whitney family. This project should not be a burden to them, they are not the people that contaminated the property.]

EPA Response: EPA expects that settlement discussions with potentially responsible parties will begin in 2018. EPA estimates that 2 years will be required to design the remedy and that an estimated 1-2 years will be required to construct the remedy. EPA expects to coordinate with the Settling Parties implementing the remedy and the OU4 landowners to minimize impacts to existing businesses, to the extent practicable.

S&J Property Management Comment 4:
Will there be loss of use? Whitneys have at this time around 14 tenants that rely on this for the operation of their business and all employ people with families that rely on this to support their families. We are talking a lot of good people.

EPA Response: The selected remedy, through the remedial design process, will include a sequencing plan for implementing the remedy in a manner that minimizes disruptions to ongoing business operations to the extent practical, including determining whether existing business on the properties will need to be relocated.

<u>Comments submitted by Loureiro on behalf of 280 Salem Street, LLC, by letter dated 9/7/17</u>

280 Salem Street, LLC Comment 1:
280 Salem Street, LLC has significantly improved the conditions at the properties and improvements have contributed to the reduction of risks associated with any pre-existing contamination.

EPA Response: EPA agrees that 280 Salem Street LLC has improved the visual aesthetic conditions at the property by removing hundreds of junked cars around 2004/2005 and building the hockey arena in 2008/2009. On May 7, 2004, EPA provided 280 Salem Street LLC with a letter summarizing the status of the cleanup at the Site and recommendations for moving forward with construction of the hockey arena. In May 2006, EPA approved 280 Salem Street LLC's Soil and Groundwater Management Plan, which was implemented during the hockey arena construction. In addition, EPA approved 280 Salem Street LLC's vapor mitigation barrier which was voluntarily installed during the hockey arena construction.

280 Salem Street, LLC Comment 2:
In providing these comments, 280 Salem Street, LLC reminds the USEPA that the LLC did not cause, contribute to, or exacerbate any of the releases of oil or hazardous materials identified at the properties. All releases identified at the properties occurred decades prior to the LLC's acquisition of the properties.

EPA Response: See above response to 280 Salem Street, LLC Comment 1.

280 Salem Street, LLC Comment 3:
The former Aberjona Auto Parts property is currently used for several businesses including automobile repair businesses, a used car sales business and storage for new vehicles. This area is heavily used throughout the day as automobiles are delivered, repaired, stored and returned to business patrons. The proposed excavation and cap construction activities would occur in an area that these businesses use and as such construction would cause significant business disruption to the property.

EPA Response: The selected remedy, through the remedial design process, will include a sequencing plan for implementing the remedy in a manner that minimizes disruptions to on-going business operations, to the extent practical, including determining whether existing business on the properties will need to be relocated. EPA's May 7, 2004 correspondence to 280 Salem Street LLC also emphasized, "that the implementation of response actions at the Site (including but not limited to work required to complete any Remedial Investigation/Feasibility Study and work required to implement any Record of Decision which will be issued for the Site) may interfere with your use of the Property, and may require closure of your operations or a *part thereof. EPA will, consistent with its responsibilities under applicable law, use reasonable efforts to minimize any interference with your operations by such entry and response."*

280 Salem Street, LLC Comment 4:
Loureiro acknowledges the presence of soil at concentrations exceeding applicable cleanup standards [on the former Aberjona Auto Parts property] however we conclude that adequate risk reduction can be achieved through the maintenance of the existing paved surface and controls on future development through deed restrictions (*i.e*., Activity and Use Limitation, AUL). Maintenance of the existing asphalt surface would both obviate the need for soil excavation and cap construction thus eliminating the disruption to the auto repair operations, and would provide the necessary barrier between contaminated soil and those who might become exposed to such contaminants. Finally, the existing asphalt cap would provide the same reduction in contaminant migration as the USEPA hopes to achieve with the construction of the proposed cap.

EPA Response: EPA disagrees with the comment. Inspections of the existing pavement on the Aberjona Property characterized the condition of the pavement as "poor." (2016 FS Report, Appendix A). Soils on the Aberjona Property above the water table contain naphthalene, TCE, C9-C10 aromatics, and C11-C22 aromatics above the leaching-based remediation goals. (FS Report, Appendix D). In addition, the cap must be designed to: "prevent infiltration of surface water and leaching of COCs from soil above the water table into groundwater. The cap will be adequately designed with long-term integrity for seasonal conditions, severe storms and freeze thaw conditions, and to satisfy ARARs. Conceptually the cap would include a geotextile layer, a base layer, a plastic liner and an impermeable top layer such as asphalt. The design would include a plan for management of stormwater. For example, the design may include catch basins and outfall pipes to the nearest water body. An inspection and maintenance plan will ensure continued cap integrity." (2016 FS Report, p. 5-27) Therefore, the existing pavement is in poor condition, and the selected remedy requires an appropriate design and construction of an impermeable cap to achieve the remediation goals.

280 Salem Street, LLC Comment 5:
Loureiro and 280 Salem Street, LLC are concerned about the
significant business interruption associated with the installation of the wells and trench/piping network. The proposed plan describes a network that would extend across the center of the Aberjona property where a significant number of the automobiles are stored and where effectively all of the traffic associated with site activities must pass. Loureiro recommends that any such piping and well installation work be carefully considered and coordinated in a manner that does not interfere with daily site activities.

EPA Response: See above response to 280 Salem Street, LLC Comment 3.

280 Salem Street, LLC Comment 6:
Figure 3 of the Proposed Plan depicts the proposed construction of a Treatment Plant to the northwest of the existing Holland Arena. Recognizing that the Figure indicates that the location is "to be determined" 280 Salem Street, LLC is opposed to its placement on the arena property because it is proposed in the location scheduled for an addition to the arena. Holland Arena has proposed its second phase of development on the parcel with a new building and ice surface. Placement of the Treatment Plant is not compatible with and will interfere with the expansion of the arena facility which is planned for the spring of 2018. Loureiro suggests that it would be appropriate to place the Treatment Plan on either the northwestern portion of the Whitney Barrel property or the Murphy Waste Oil property. It is more appropriate, practicable and equitable that as the bulk of the groundwater contamination is present on these properties, the Treatment Plant should be placed on one or both of these properties rather than on the arena property, which is relatively clean.

EPA Response: EPA acknowledges the 280 Salem Street, LLC's comment and plans for expanding the hockey arena to the north of the existing arena. EPA's conceptual plan for the selected groundwater remedy conceptually illustrated the location of the groundwater treatment plant to the north of the existing hockey arena and described the location as "TO BE DETERMINED." The pre-design and design process will consider existing conditions on the properties before a final decision is made regarding the location of the groundwater treatment plant.

280 Salem Street, LLC Comment 7:
Finally, a dog daycare business has been in operation at the property for more than ten years. The dog daycare facility is located inside the building as well as an extensive outside area covered with artificial turf on which the dogs are exercised. The activities proposed at the Aberjona property as well as the other Southwest Properties will significantly disrupt this business' ability to operate during the proposed two year construction period. First, the work will prevent the use of the site for the daycare business. Second, excavation activities will damage the artificial turf. In all likelihood, the responsible parties will be required to replace the expensive artificial turf in its entirety rather than patch it. Third, the construction activities will be disruptive to property access and egress. Finally, the construction equipment noise will be significantly disruptive to the animals.

EPA Response: See above response to 280 Salem Street, LLC Comment 3.

<u>Comments received from Aberjona Study Coalition, Inc. (ASC) by letter dated 8/11/17</u>

ASC Comment 1:
After reviewing the RI, FS and [Proposed] Plan, we believe that overall the Plan is implementable, and with the proposed institutional controls, will result in properties that are safe for current and future uses of the properties.

EPA Response: EPA acknowledges the ASC's comment and agrees that the selected remedy is implementable and will result in properties that are safe for current and future uses.

ASC Comment 2:
What level of disruption is anticipated for businesses operating at these properties? Tenants may not be as well informed as owners of the properties. Measures should be taken to accommodate such tenants during the cleanup. Tenants of these properties should be given as much notice as possible regarding activities that could disrupt business operations, especially if such activities will have a major impact on business operations.

EPA Response: The selected remedy, through the remedial design process, will include a sequencing plan for implementing the remedy in a manner that minimizes disruptions to on-going business operations, to the extent practical, including determining whether existing business on the properties will need to be relocated.

ASC Comment 3:
While the institutional controls will remain in place [over the course of the estimated 20 years for groundwater treatment], a review of potential vapor intrusion issues should be specifically required as part of the Five Year Review to assess protectiveness of the [Proposed] Plan.

EPA Response: As specified in the selected remedy, "institutional controls require the evaluation of the vapor intrusion pathway if a change in building usage of any of the existing buildings is contemplated or as part of new building construction, including any addition/alteration to existing buildings on any of the properties. Should someone wish to demonstrate that there are no unacceptable risks from vapor intrusion and therefore mitigation systems are not required, an evaluation of vapor intrusion risks (following EPA-approved procedures and subject to EPA approval) may be performed prior to a change in building usage or the building of structures above the VOC plume to demonstrate that vapor intrusion risks are within or below EPA's target risk levels (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1)." (ROD, Section L) The review of institutional controls including this vapor intrusion pathway will be included as part of the Five Year Review process.

ASC Comment 4:
Given that institutional controls are a key part of the Plan, specific deed restrictions and institutional controls should be detailed and the public should be informed of these controls to ensure that public health will be protected.

EPA Response: As described in the selected remedy, "the details of the Institutional Controls will be resolved during the pre-design and remedial design phase in coordination with the parties performing the Remedial Action, impacted landowners, local officials, and MassDEP. Institutional Controls may be implemented through measures that may include, but are not limited to, a local Town ordinance, a Notice of Activity and Use Limitation (NAUL), or a Grant of Environmental Restriction and Easement (GERE)." (ROD, Section L)

ASC Comment 5:
The Proposed Plan includes institutional controls on groundwater. The Massachusetts Contingency Plan specifies that groundwater aquifers are state resources and that institutional controls cannot be placed on groundwater unless the State designates these groundwater areas as inappropriate for the uses that pose risk in the human health risk characterization.

EPA Response: The selected remedy requires institutional controls for contaminated groundwater only until cleanup levels are achieved. The selected remedy in the Record of Decision states that the institutional controls, "… prohibit future use of impacted groundwater as a drinking water source <u>until cleanup levels are achieved</u>." (ROD, Section L) EPA will coordinate with MassDEP during the remedial design and remedial action, including with respect to implementation of the institutional controls.

ASC Comment 6:
For non-carcinogens, why is an Hazard Index of 1 used to develop PRGs? Using a target hazard index of 1 for all chemicals leaves open the possibility that the cumulative hazard index across all chemicals could be greater than 1. It is true that not all chemicals affect the body in the same way, but without consideration of target organs affected by each chemical, would it not be possible for risks to exceed State and Superfund guidelines?

EPA Response: Residual risk for the soil and sediment PRGs has been calculated in Appendix C-12 of the Feasibility Study (FS), Tables C12-2 (soil) and C12-3 (sediment). The residual risk calculations were not updated as part of the 2017 FS Report Addendum - Technical Memorandum because the changes to the PRGs, as described in the FS Report Addendum –

Technical Memorandum either reduced the residual risk (i.e., the PRGs decreased or contaminants of concern were removed) or the PRGs increased, but by a negligible amount. No residual risk calculation is performed for groundwater PRGs because, before the remedy is considered complete, a risk evaluation will be performed on the residual groundwater contamination to determine whether the remedy is protective. After all groundwater cleanup levels have been met as determined by EPA, EPA will perform a risk evaluation which considers additive risk from remaining COCs considering all potential routes of exposure to document the residual risk based on exposure to groundwater at the site. The protectiveness of the remedy will also be periodically assessed as part of the Five-Year Review process.

ASC Comment 7:
Best management practices should be implemented to ensure trucks do not track soil and sediments from the property onto nearby roads and properties, especially for vehicles operating off of paved areas at the site.

EPA Response: During the remedial design and remedial action, appropriate Health & Safety Plans shall be prepared and implemented for the selected remedy, including the establishment of exclusion, decontamination, and safe zones. EPA agrees that during the remedial design and remedial action best management practices shall be implemented, including cleaning truck tires and securing truck loads before exiting the SWP to minimize dirt on public roads.

ASC Comment 8:
ASC would appreciate the opportunity to review and comment on the findings of the pre-design investigations to refine the vertical and horizontal extent of wetland sediment and soil exceeding cleanup levels, as well as any changes to the proposed plan that significantly affect the areal extent of the work to be conducted in the wetlands.

EPA Response: In the selected remedy, "EPA has determined that because significant levels of contamination exist in wetlands within the SWP cleanup areas, there is no practicable alternative to permanently removing the contaminants from these wetlands." (ROD, Section M) EPA will continue to coordinate with the ASC, recipient of a Technical Assistance Grant, and provide ASC with opportunity to review and comment on the remedial designs which will include the findings of the pre-design investigations.

ASC Comment 9:
It is not clear what long-term monitoring is proposed to evaluate the effectiveness of the soil remedy. All aspects of the proposed long-term monitoring should be clearly detailed in the

remedial design, including what actions will be taken if monitoring reveals that remediation goals are not being met.

EPA Response: The details of the long-term monitoring will be determined during the remedial design process.

ASC Comment 10:
Strong effort should be made to minimize temporary impacts of construction on the floodplain. In the long term, as long as there is no net loss of flood storage capacity (as proposed), and efforts are taken to minimize temporary impacts, the proposed plan is acceptable.

EPA Response: Under the selected remedy, "EPA has determined there is no practicable alternative to occupancy and modification of the Aberjona River floodplain. EPA will avoid or minimize potential harmful temporary and permanent impacts on floodplain resources within the 500-year floodplain, to the extent practical, within the cleanup areas including the Murphy Wetland. In addition, the cleanup plan selected by EPA includes provisions for no net flood storage loss (e.g., soil removed prior to cap installation so no net flood storage loss, sediments removed and clean wetland soils backfilled to original grades, etc.)." (ROD, Section M)

ASC Comment 11:
Site-specific calculations of health risks based on recreational exposure to soil indicate that risks will be within generally recognized guidelines at a cleanup level for PCBs at 5.3 mg/kg. As proposed in the Plan, institutional controls should be implemented for properties containing PCBs in soil above a concentration of 1 mg/kg to ensure that no future residences are constructed in areas containing residual levels of PCB contamination above 1 mg/kg.

EPA Response: EPA agrees with the comment. The selected remedy, in compliance with TSCA, requires "[R]isks from unrestricted exposure to PCBs between 1 milligram/kilogram and 5.3 milligrams/kilogram for PCBs in contaminated soil will be addressed by Institutional Controls that will prevent residential, school, and daycare development (throughout the SWP except within the existing residential area within the Aberjona parcel and in the Murphy Wetland where no residential exposure is anticipated)." (ROD, Section M)

<u>Comments from Massachusetts Department of Environmental Protection received by letter on 8/11/17</u>

MassDEP Comment 1:
MassDEP agrees with EPA's selection of the preferred remedial alternatives for the Southwest Properties. MassDEP agrees that the preferred alternatives will meet ARARs and are protective of human health and the environment. The preferred alternatives also represent the best balance among the EPA's balancing criteria including long-term and short-term protection; reduction of mobility, toxicity and volume of contamination; implementability, and cost. The preferred alternatives can also be completed in a reasonable amount of time, and allow for the greatest reuse of these properties on this portion of the site. Further, MassDEP *does not support any of the other (non-preferred) alternatives for soil, groundwater, NAPL or wetland remediation* for the reasons provided in the Proposed Plan.

EPA Response: EPA acknowledges MassDEP's comment and agreement with the Agency's selected remedy.

MassDEP Comment 2:
MassDEP understands that impermeable caps will not be required over NAPL contaminated soils on the Murphy and Whitney properties or at the Northern Whitney Soil Area because soils will likely be excavated to the water table, thereby preventing further leaching from soils to groundwater. However, MassDEP recommends that impervious caps be required over these areas, since 1) the water table could fluctuate in depth over time, thereby exposing contaminated soils that were previously below the water table, and 2) uncapped soils may give the impression that soils in the uncapped areas have been fully remediated, even below the water table.

EPA Response: EPA's 2017 FS Report Addendum and the selected remedy includes impermeable caps being extended over all soil remediation areas. This also covers significant areas of the NAPL excavation area. However, capping is not an identified component of the NAPL remedy since all NAPL-contaminated soil is to be removed, to the extent practicable

MassDEP Comment 3:
The de-watering of the excavation requires the treatment of the water extracted. It was indicted that the water be treated on site or appropriately discharged to a POTW. If the POTW is the MWRA system, it has been the MassDEP's understanding that the MWRA does not take discharges from contaminated sites. It is suggested that EPA confirm if the MWRA is willing to take dewatering discharge, if they are not, then eliminate this from the ROD.

EPA Response: EPA has clarified in the Record of Decision that the de-watering of the excavation and the options for water treatment includes as an option, if appropriate, approved discharge to a POTW. A determination as to whether water generated from the remedial action may be discharged to a POTW will be made during remedial design, so it is premature to exclude it as an option in the ROD.

Comments Received at the August 3, 2017 Public Hearing

Resident Comment:
Local resident stated, "they did some work down there at the cranberry bogs and I have to say they did a nice job down there. How do you know when you're going to do the ground and going to test it all, how do the common layperson like myself get updates of the testing after the job is done? Like, I have no idea now how cranberry bogs are doing after all the work is done there. I don't know where you get that information of, you know, six months I'm going to test it and see how it is doing and stuff like that. I just don't know, you know -- we agree and everything and all of a sudden we just take your word that it's going to be all okay and stuff like that, and it's still okay. I just don't know how that works."

EPA Response: The Commenter was addressing an area along the Aberjona River outside of OU4 (addressed under the cleanup plan for Industri-plex OU2 remedy, that includes the Aberjona River within the Wells G&H Site). Therefore, his comments are outside of the scope of this OU4 Responsiveness Summary.

However, EPA provides the following general information regarding where the public may find current information on the Wells G&H Superfund Site. The public can view current public information for the site by navigating to the site's URL https://www.epa.gov/superfund/wellsgh *using an internet connection. Site reports and Administrative Record files are available using the links in the "Site Reports and Documents" (green box) on the right side of the internet Site Profile Page. Note that public internet access is available at the Woburn Public Library, 45 Pleasant St, Woburn, MA. Future Administrative Records files and other documents will be automatically added to these collections. In addition, paper copies of documents can be reviewed (please call to schedule) at the EPA New England Records Center, 5 Post Office Sq., First Floor, Boston, MA.*

APPENDICES

Appendix A: State DEP Letter of Concurrence

Appendix B: Tables

Appendix C: Figures

Appendix D: ARARs Tables

Appendix E: TSCA Determination

Appendix F: Acronyms and Abbreviations

Appendix G: Administrative Record Index and Guidance Documents

Appendix A: State DEP Letter of Concurrence

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Commissioner

September 28, 2017

Mr. Bryan Olson, Director
Office of Site Remediation and Restoration
U.S. EPA Region I
Suite 100
5 Post Office Square
Boston, MA 02109

Subject: MassDEP Concurrence Letter
Record of Decision for Wells G&H Superfund Site
Operable Unit #4 – Southwest Properties

Dear Mr. Olson:

The Department of Environmental Protection (MassDEP) has reviewed the U.S. Environmental Protection Agency's (EPA's) proposed Record of Decision (ROD) for the Wells G&H Superfund site - Operable Unit #4 (OU4) (the Site). This letter provides MassDEP's concurrence of the ROD, subject to some considerations discussed below.

Background: EPA has issued a ROD for the Southwest Properties (OU4) of the Wells G&H site. This ROD was developed after many years of ongoing investigations and evaluations. Most recent assessments have included the 2014 (final) Baseline Risk Assessment, the November 2016 Remedial Investigation, the December 2016 Feasibility Study, the July 2017 Feasibility Report Addendum – Technical Memorandum, and July 2017 Proposed Plan.

The Selected Remedy presented in the ROD will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through treatment, engineering controls and Institutional Controls. The SWP will be cleaned up to support industrial/commercial/recreational use. The main components of the Remedy include:

1. Excavation and off-site disposal of approximately 5,400 cubic yards of significantly contaminated soil at the designated Northern Whitney Soil Area, and blending remaining contaminated soil below the water table with an amendment prior to backfilling to provide soil and localized groundwater treatment. In addition, excavation and off-site disposal of approximately 12,400 cubic yards of soil to facilitate capping and maintain flood storage, and construction of impermeable caps over the remaining lower concentration soils that exceed cleanup levels to reduce soil exposure risks and/or prevent contaminant movement to groundwater;
2. Excavation and off-site disposal of NAPL, including approximately 6,000 cubic yards of NAPL-contaminated soil and the blending any remaining NAPL-contaminated soil below the water table with an amendment prior to backfilling to provide soil and localized groundwater treatment;
3. Containment and cleanup of groundwater contaminants by pumping and treating the groundwater;
4. Excavation and off-site disposal of approximately 7,000 cubic yards of wetland sediment/soil exceeding cleanup levels and wetland restoration;
5. Long-term monitoring;
6. Institutional Controls to maintain the integrity of the soil caps, to prevent development of the properties for residential, school, and daycare use, to prohibit use of contaminated groundwater until cleanup levels are met, and to require evaluation of the vapor intrusion pathway if a change in usage of any of the existing commercial buildings is contemplated, or as part of new building construction, including any addition/alteration to existing buildings on any of the properties.

The proposed remedy is estimated to cost approximately $19.1 million and is expected to take 1-2 years to construct. Groundwater is estimated to achieve cleanup standards in 20 years.

<u>MassDEP Concurrence</u>.

MassDEP agrees with EPA's Selected Remedy for the Southwest Properties (OU4) of the Wells G&H Superfund site. MassDEP agrees that the Selected Remedy would meet ARARs and be protective of both human health and the environment. MassDEP believes the Selected Remedy represents the best balance among the EPA's balancing criteria including long-term and short-term protection; reduction of mobility, toxicity and volume of contamination; implementability, and cost. The Selected Remedy can also be completed in a reasonable amount of time, and allow for the greatest reuse of these properties on this portion of the site. Therefore, for these reasons, MassDEP concurs with the Selected Remedy as presented in ROD.

If you have any questions or comments on this letter, please contact, me or Paul Craffey at (617) 292-5591.

Very truly yours,

Paul W. Locke,
Assistant Commissioner

e-file: 20170928_WellsGHOU4_RODConcurrenceLtr.docx

Appendix B: Tables

ROD RISK WORKSHEET

Table G-1

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Whitney Property								
	Vinyl Chloride	6.9E-03	3.1E+00	mg/kg	5/36	3.1E+00	mg/kg	Max
	Total PCBs	1.9E-02	4.3E+01	mg/kg	31/35	9.1E+00	mg/kg	95% UCL
	PCB TEQ	8.8E-07	7.2E-04	mg/kg	24/24	1.6E-04	mg/kg	95% UCL
	Arsenic	2.3E+00	1.7E+01	mg/kg	37/37	8.4E+00	mg/kg	95% UCL
	Chromium (VI)	4.8E-01	2.9E+01	mg/kg	29/37	8.7E+00	mg/kg	95% UCL
Murphy Property								
	Thallium	5.40E-02	1.00E+01	mg/kg	10/17	6.61E+00	mg/kg	95% UCL

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in surface soil at the Whitney Property and Murphy Property (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in surface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that: vinyl chloride, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, total PCBs, PCB TEQ, arsenic and hexavalent chromium are the only COCs in surface soil at the Whitney Property; and thallium is the only COC in surface soil at the Murphy Property. The 95% UCL on the arithmetic mean was used as the EPC for all COCs except for vinyl chloride at the Whitney Property, for which maximum detected concentrations was used as the EPC.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-2

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Whitney Property								
	Vinyl Chloride	3.2E-03	6.9E-01	mg/kg	5/58	6.9E-01	mg/kg	Max
	Trichloroethylene	1.6E-03	2.6E+03	mg/kg	12/58	1.6E+02	mg/kg	95% UCL
	bis(2-Ethylhexyl)phthalate	4.0E-01	4.4E+02	mg/kg	5/9	4.4E+02	mg/kg	Max
	alpha-Chlordane	3.9E-04	7.2E+02	mg/kg	46/53	1.8E+02	mg/kg	95% UCL
	gamma-Chlordane	1.0E-03	9.9E+02	mg/kg	43/53	2.2E+02	mg/kg	95% UCL
	alpha-BHC	6.0E-02	1.0E+01	mg/kg	3/53	1.0E+01	mg/kg	Max
	Heptachlor	5.3E-03	1.1E+02	mg/kg	7/53	1.1E+02	mg/kg	Max
	Heptachlor Epoxide	3.1E-03	8.0E-01	mg/kg	5/49	8.0E-01	mg/kg	Max
	Dieldrin	5.4E-04	1.3E+01	mg/kg	14/54	3.2E+00	mg/kg	95% UCL
	4,4'-DDD	7.2E-04	9.6E+01	mg/kg	33/54	1.6E+01	mg/kg	95% UCL
	4,4'-DDT	7.6E-04	2.9E+02	mg/kg	28/52	2.0E+01	mg/kg	95% UCL
	Total PCBs	1.7E-02	1.5E+03	mg/kg	37/54	4.3E+02	mg/kg	95% UCL
	PCB TEQ	2.2E-07	2.6E-02	mg/kg	32/32	6.9E-03	mg/kg	95% UCL
	Arsenic	1.2E+00	1.4E+02	mg/kg	54/54	3.2E+01	mg/kg	95% UCL
	Chromium (VI)	4.5E-01	2.9E+01	mg/kg	29/54	5.8E+00	mg/kg	95% UCL
Murphy Property								
	Thallium	6.9E-02	3.0E+01	mg/kg	16/64	7.1E+00	mg/kg	95% UCL

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in subsurface soil at the Whitney Property and Murphy Property (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in subsurface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that: vinyl chloride, trichloroethylene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, dibenz(a,h)anthracene, alpha- and gamma-chlordane, alpha-BHC, heptachlor, heptachlor epoxide, dieldrin, 4,4'-DDD, 4,4'-DDT, total PCBs, PCB TEQ, arsenic and hexavalent chromium are the only COCs in subsurface soil at the Whitney Property; and thallium is the only COC in subsurface soil at the Murphy Property. The 95% UCL on the arithmetic mean was used as the EPC for all COCs except for vinyl chloride, bis(2-ethylhexyl)phthalate, alpha-BHC, heptachlor and heptachlor epoxide at the Whitney Property, for which maximum detected concentrations were used as EPCs.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
Murphy Wetland								
	C11-C22 Aromatics	2.2E+01	9.7E+04	mg/kg	43/43	2.6E+04	mg/kg	95% UCL
	Total PCBs	1.1E-01	4.5E+02	mg/kg	55/59	7.5E+01	mg/kg	95% UCL
	Lead	3.0E+01	3.5E+04	mg/kg	62/62	2.4E+03	mg/kg	Mean

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

PCB - Polychlorinated biphenyl.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs detected in sediment (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in sediment). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that Total PCBs, C11-C22 aromatics and lead are the only COCs in Murphy Wetland sediment. The 95% UCL on the arithmetic mean was used as the EPC for Total PCBs and C11-C22 aromatics, while the mean concentration was used as the EPC for lead.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-4

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected Minimum	Concentration Detected Maximum	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
SWP-Wide Groundwater								
	Benzene	5.9E-03	5.5E+01	µg/L	37/56	5.5E+01	µg/L	Max
	Dichlorobenzene, 1,4-	8.1E-02	3.7E+01	µg/L	13/38	3.7E+01	µg/L	Max
	Dichloroethane, 1,1-	1.2E-01	1.2E+03	µg/L	24/38	1.2E+03	µg/L	Max
	Dichloroethane, 1,2-	6.0E-03	6.9E+00	µg/L	19/38	6.9E+00	µg/L	Max
	Dichloroethene, 1,1- (1)	6.7E-03	6.8E+01	µg/L	31/56	6.8E+01	µg/L	Max
	Dichloroethene, cis-1,2-	7.9E-03	3.5E+04	µg/L	46/56	3.5E+04	µg/L	Max
	Dichloroethene, trans-1,2- (1)	4.5E-03	1.9E+02	µg/L	37/56	1.9E+02	µg/L	Max
	Dioxane, 1,4-	2.2E-01	7.9E+01	µg/L	11/18	7.9E+01	µg/L	Max
	Ethylbenzene	5.9E-03	1.1E+02	µg/L	24/56	1.1E+02	µg/L	Max
	Methyl tert-Butyl Ether	1.1E-01	8.6E+01	µg/L	16/38	8.6E+01	µg/L	Max
	Methylene Chloride	1.5E+03	1.5E+03	µg/L	1/38	1.5E+03	µg/L	Max
	Tetrachloroethylene	7.0E-03	2.0E+03	µg/L	47/56	2.0E+03	µg/L	Max
	Trichlorobenzene, 1,2,3-	1.5E-01	5.0E+01	µg/L	5/38	5.0E+01	µg/L	Max
	Trichlorobenzene, 1,2,4-	1.2E-01	1.7E+02	µg/L	8/38	1.7E+02	µg/L	Max
	Trichloroethane, 1,1,1- (1)	1.2E-01	3.3E+03	µg/L	20/56	3.3E+03	µg/L	Max
	Trichloroethane, 1,1,2-	7.2E-01	7.2E-01	µg/L	1/38	7.2E-01	µg/L	Max
	Trichloroethylene	4.1E-03	4.0E+03	µg/L	53/56	4.0E+03	µg/L	Max
	Vinyl Chloride	4.6E-03	2.6E+03	µg/L	36/56	2.6E+03	µg/L	Max
	Xylenes (total)	1.7E-02	5.1E+02	µg/L	27/56	5.1E+02	µg/L	Max
	C5-C8 Aliphatics	3.9E+01	4.5E+03	µg/L	13/38	4.5E+03	µg/L	Max
	C9-C12 Aliphatics	5.3E+01	9.0E+01	µg/L	5/38	9.0E+01	µg/L	Max
	C9-C10 Aromatics	5.1E+01	1.0E+03	µg/L	10/38	1.0E+03	µg/L	Max
	C9-C18 Aliphatics	1.4E+02	1.4E+02	µg/L	1/38	1.4E+02	µg/L	Max
	C11-C22 Aromatics	1.4E+02	5.9E+02	µg/L	9/38	5.9E+02	µg/L	Max
	Benzo(a)pyrene	1.4E-02	8.8E-02	µg/L	6/38	8.8E-02	µg/L	Max
	Methylnaphthalene, 2-	3.5E-01	8.9E+01	µg/L	4/38	8.9E+01	µg/L	Max
	Naphthalene	1.2E-01	3.4E+02	µg/L	7/38	3.4E+02	µg/L	Max
	PCB TEQ	1.4E-08	1.1E-04	µg/L	38/38	1.1E-04	µg/L	Max
	Total PCBs	2.1E-06	2.5E+01	µg/L	38/38	2.5E+01	µg/L	Max
	4,4'-DDD	1.0E-03	8.5E-01	µg/L	12/37	8.5E-01	µg/L	Max
	4,4'-DDE (2)	7.5E-04	8.3E-02	µg/L	10/38	8.3E-02	µg/L	Max
	4,4'-DDT	1.1E-03	3.4E-01	µg/L	12/37	3.4E-01	µg/L	Max
	Aldrin	6.7E-03	2.2E-01	µg/L	7/36	2.2E-01	µg/L	Max
	alpha-BHC	2.7E-03	3.1E+00	µg/L	5/36	3.1E+00	µg/L	Max
	alpha-Chlordane	1.0E-03	4.3E-01	µg/L	11/37	4.3E-01	µg/L	Max
	beta-BHC	1.3E-03	4.1E-01	µg/L	9/36	4.1E-01	µg/L	Max
	Dieldrin	1.3E-03	2.0E-02	µg/L	6/36	2.0E-02	µg/L	Max
	Lindane	9.7E-03	5.7E+00	µg/L	3/37	5.7E+00	µg/L	Max
	gamma-Chlordane	1.6E-03	3.4E-01	µg/L	14/38	3.4E-01	µg/L	Max
	Heptachlor	3.6E-02	6.0E-01	µg/L	2/33	6.0E-01	µg/L	Max
	Heptachlor Epoxide	3.3E-03	1.9E-01	µg/L	6/36	1.9E-01	µg/L	Max
	Arsenic	4.4E-01	3.9E+02	µg/L	35/52	3.9E+02	µg/L	Max
	Cobalt	1.9E-01	1.6E+01	µg/L	39/52	1.6E+01	µg/L	Max
	Iron	6.7E+01	3.4E+04	µg/L	55/56	3.4E+04	µg/L	Max
	Lead	5.0E-02	1.3E+02	µg/L	41/52	1.3E+02	µg/L	Max
	Manganese	3.6E+00	4.9E+03	µg/L	56/56	4.9E+03	µg/L	Max
Whitney Property Shallow Groundwater								
	Dichloroethene, cis-1,2-	3.3E-02	3.5E+04	µg/L	9/11	3.5E+04	µg/L	Max
	Tetrachloroethylene	9.7E-03	2.0E+03	µg/L	7/11	2.0E+03	µg/L	Max
	Trichloroethylene	7.2E-02	4.0E+03	µg/L	11/11	4.0E+03	µg/L	Max
Murphy Property Shallow Groundwater								
	Dichloroethene, cis-1,2-	3.8E-01	2.4E+04	µg/L	9/10	2.40E+04	µg/L	Max

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

Multiple results from each on-site monitoring well were treated as discrete samples.

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

MCL - Maximum contaminant level.

(1) Though not identified as a risk contributor in the baseline HHRA or no longer identified as a risk contributor due to a toxicity value change, these compounds are Included as COCs due to MCL exceedances.

(2) Though not identified as a COC in the baseline HHRA, this chemical would now be identified as a COC (see Attachment 2 of the 2017 FS Report Addendum).

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in SWP-wide groundwater and shallow groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in SWP-wide and shallow groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the SWP), the EPC, and how the EPC was derived. This table indicates that the inorganic chemicals, arsenic, cobalt, lead, iron, and manganese, and the organic chemicals, benzene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, tetrachloroethylene, trichloroethylene, vinyl chloride, PCB TEQ and total PCBs are the most frequently detected COCs in SWP-wide and shallow groundwater. The maximum detected concentration, identified assuming multiple results from each monitoring well were treated as discrete samples, was used as the EPC for each of the COCs detected in groundwater.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-5

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date [1] (MM/DD/YYYY)
Benzene	5.5E-02	5.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Dichlorobenzene, 1,4-	5.4E-03	5.4E-03	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Dichloroethane, 1,1-	5.7E-03	5.7E-03	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	02/01/17
Dichloroethane, 1,2-	9.1E-02	9.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Dichloroethene, 1,1-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Equivocal	IRIS	02/01/17
Dichloroethene, cis-1,2-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Dichloroethene, trans-1,2-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Dioxane, 1,4-	1.0E-01	1.0E-01	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	02/01/17
Ethylbenzene	1.1E-02	1.1E-02	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Methyl tert-Butyl Ether	1.8E-03	1.8E-03	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Methylene Chloride	2.0E-03	2.0E-03	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	02/01/17
Tetrachloroethylene	2.1E-03	2.1E-03	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	02/01/17
Trichlorobenzene, 1,2,3-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
Trichlorobenzene, 1,2,4-	2.9E-02	2.9E-02	$(mg/kg\text{-}day)^{-1}$	Likely	PPRTV	02/01/17
Trichloroethane, 1,1,1-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Trichloroethane, 1,1,2-	5.7E-02	5.7E-02	$(mg/kg\text{-}day)^{-1}$	C	IRIS	02/01/17
Trichloroethylene	4.6E-02	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	02/01/17
Vinyl Chloride	7.2E-01	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Xylenes (total)	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
C5-C8 Aliphatics	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Suggestive	PPRTV	02/01/17
C9-C12 Aliphatics	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
C9-C10 Aromatics	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
C9-C18 Aliphatics	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
C11-C22 Aromatics	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
Benzo(a)pyrene	1.0E+00	1.0E+00	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	02/01/17
bis(2-Ethylhexyl)phthalate	1.4E-02	1.4E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Methylnaphthalene, 2-	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Naphthalene	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	C	IRIS	02/01/17
PCB TEQ	1.3E+05	1.3E+05	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Total PCBs	2.0E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
4,4'-DDD	2.4E-01	2.4E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
4,4'-DDE	3.4E-01	3.4E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
4,4'-DDT	3.4E-01	3.4E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Aldrin	1.7E+01	1.7E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
alpha-BHC	6.3E+00	6.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
alpha-Chlordane	3.5E-01	3.5E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
beta-BHC	1.8E+00	1.8E+00	$(mg/kg\text{-}day)^{-1}$	C	IRIS	02/01/17
Dieldrin	1.6E+01	1.6E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Lindane	1.1E+00	1.1E+00	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
gamma-Chlordane	3.5E-01	3.5E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Heptachlor	4.5E+00	4.5E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Heptachlor Epoxide	9.1E+00	9.1E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Arsenic	1.5E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Chromium (VI)	5.0E-01	2.0E+01	$(mg/kg\text{-}day)^{-1}$	NA	NJDEP	02/01/17
Cobalt	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	PPRTV	02/01/17
Iron	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
Lead	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Manganese	N/A	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	02/01/17

Table G-5

Cancer Toxicity Data Summary

Thallium	N/A	N/A	$(mg/kg\text{-}day)^{-1}$		Inadequate	IRIS	02/01/17

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date [(1)] (MM/DD/YYYY)
Benzene	7.8E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Dichlorobenzene, 1,4-	1.1E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Dichloroethane, 1,1-	1.6E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	02/01/17
Dichloroethane, 1,2-	2.6E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Dichloroethene, 1,1-	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Suggestive	IRIS	02/01/17
Dichloroethene, cis-1,2-	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Dichloroethene, trans-1,2-	N/A	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Dioxane, 1,4-	5.0E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	02/01/17
Ethylbenzene	2.5E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Methyl tert-Butyl Ether	2.6E-07	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Methylene Chloride	1.0E-08	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	02/01/17
Tetrachloroethylene	2.6E-07	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	IRIS	02/01/17
Trichlorobenzene, 1,2,3-	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
Trichlorobenzene, 1,2,4-	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	PPRTV	02/01/17
Trichloroethane, 1,1,1-	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Trichloroethane, 1,1,2-	1.6E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	IRIS	02/01/17
Trichloroethylene	4.1E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	02/01/17
Vinyl Chloride	4.4E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Xylenes (total)	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
C5-C8 Aliphatics	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Suggestive	PPRTV	02/01/17
C9-C12 Aliphatics	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
C9-C10 Aromatics	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
C9-C18 Aliphatics	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
C11-C22 Aromatics	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
Benzo(a)pyrene	6.0E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	02/01/17
bis(2-Ethylhexyl)phthalate	2.4E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	02/01/17
Methylnaphthalene, 2-	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17
Naphthalene	3.4E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	02/01/17

Table G-5

Cancer Toxicity Data Summary

PCB TEQ (2)	3.8E+01	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
Total PCBs (2)	5.7E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
		$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$			
4,4'-DDD	6.9E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	02/01/17
4,4'-DDE	9.7E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	02/01/17
4,4'-DDT	9.7E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Aldrin (2)	4.9E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
alpha-BHC	1.8E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
alpha-Chlordane (2)	1.0E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
beta-BHC	5.3E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	IRIS	02/01/17
Dieldrin	4.6E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Lindane	3.1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	N/A	CalEPA	02/01/17
gamma-Chlordane (2)	1.0E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Heptachlor (2)	1.3E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Heptachlor Epoxide (2)	2.6E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Chromium (VI)	8.4E-02	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	02/01/17
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely	PPRTV	02/01/17
Iron	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	PPRTV	02/01/17
Lead	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	02/01/17
Manganese	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	D	IRIS	02/01/17
Thallium	N/A	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Inadequate	IRIS	02/01/17

Key

N/A: Not applicable

IRIS: Integrated Risk Information System, U.S. EPA

PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC

NJDEP = New Jersey Department of Environmental Protection

CalEPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

(1) Date indicates when source was last reviewed.

(2) Aldrin, chlordane, heptachlor, heptachlor epoxide, total PCBs and PCB TEQ were not classified as volatile at the time of the BHHRA, but have since been re-classified as volatile (USEPA, 2015). The unit risk, if available, has been utilized during development of cleanup levels.

For PCBs, the RME slope factor presented represents the upper-bound slope factor for high risk and persistence situations.

The slope factor presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific slope factor values of 9.3E-03 $(mg/kg\text{-}day)^{-1}$ for kidney tumors and 3.7E-02 $(mg/kg\text{-}day)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjunction with age-dependent adjustment factors, as appropriate.

The unit risk presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific unit risk values of 1E-06 $(\mu g/m^3)^{-1}$ for kidney tumors and 3.1E-06 $(\mu g/m^3)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjunction with age-dependent adjustment factors, as appropriate.

Age-dependent adjustment factors are used in conjunction with toxicity values, as appropriate, for carcinogenic PAHs, hexavalent chromium, trichloroethene, and vinyl chloride.

The slope factor and unit risk for benzo(a)pyrene has been updated since the baseline HHRA. Results presented on Risk Summary tables use the current toxicity values and exposure parameters from the baseline HHRA. Refer to Attachment 2 of the July 2017 FS Study Report Addendum for a discussion of the results based on updated toxicity values.

EPA Group

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in soil, sediment, and groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in this assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site, except for hexavalent chromium which has an adjustment factor of 0.025. For the remaining chemicals, the same oral slope factors as presented above were used as the dermal carcinogenic slope factors for these contaminants. Thirty-two of the COCs considered carcinogenic via the inhalation route were determined to be primary risk drivers for at least one exposure pathway evaluated at the site.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-6

Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ [1] (MM/DD/YYYY)
Benzene	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Immune System	300	IRIS	02/01/17
Dichlorobenzene, 1,4-	Chronic	7.0E-02	mg/kg-day	7.0E-02	mg/kg-day	Liver	100	ATSDR	02/01/17
Dichloroethane, 1,1-	Chronic	2.0E-01	mg/kg-day	2.0E-01	mg/kg-day	Kidney	3000	PPRTV	02/01/17
Dichloroethane, 1,2-	Chronic	6.0E-03	mg/kg-day	6.0E-03	mg/kg-day	Kidney	10,000	PPRTV	02/01/17
Dichloroethene, 1,1-	Chronic	5.0E-02	mg/kg-day	5.0E-02	mg/kg-day	Liver	100	IRIS	02/01/17
Dichloroethene, cis-1,2-	Chronic	2.0E-03	mg/kg-day	2.0E-03	mg/kg-day	Kidney	3000	IRIS	02/01/17
Dichloroethene, cis-1,2-	Subchronic	2.0E-02	mg/kg-day	2.0E-02	mg/kg-day	Kidney	300	PPRTV	02/01/17
Dichloroethene, trans-1,2-	Chronic	2.0E-02	mg/kg-day	2.0E-02	mg/kg-day	Immune System	3000	IRIS	02/01/17
Dioxane, 1,4-	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Kidney/Liver	300	IRIS	02/01/17
Ethylbenzene	Chronic	1.0E-01	mg/kg-day	1.0E-01	mg/kg-day	Kidney/Liver	1000	IRIS	02/01/17
Methyl tert-Butyl Ether	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	02/01/17
Methylene Chloride	Chronic	6.0E-03	mg/kg-day	6.0E-03	mg/kg-day	Liver	30	IRIS	02/01/17
Tetrachloroethylene	Chronic	6.0E-03	mg/kg-day	6.0E-03	mg/kg-day	Nervous System	1000	IRIS	02/01/17
Tetrachloroethylene	Subchronic	6.0E-03	mg/kg-day	6.0E-03	mg/kg-day	Nervous System	1000	IRIS	02/01/17
Trichlorobenzene, 1,2,3-	Chronic	8.0E-04	mg/kg-day	8.0E-04	mg/kg-day	Endocrine/Liver	10,000	PPRTV	02/01/17
Trichlorobenzene, 1,2,4-	Chronic	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	Endocrine	1000	IRIS	02/01/17
Trichloroethane, 1,1,1-	Chronic	2.0E+00	mg/kg-day	2.0E+00	mg/kg-day	Liver	1000	IRIS	02/01/17
Trichloroethane, 1,1,2-	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Liver	1000	IRIS	02/01/17
Trichloroethylene	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Cardiovascular/Developmental/Immune System	10 to 1000	IRIS	02/01/17
Trichloroethylene	Subchronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Cardiovascular/Developmental/Immune System	10 to 1000	IRIS	02/01/17
Vinyl Chloride	Chronic	3.0E-03	mg/kg-day	3.0E-03	mg/kg-day	Liver	30	IRIS	02/01/17
Xylenes (total)	Chronic	2.0E-01	mg/kg-day	2.0E-01	mg/kg-day	Nervous System	1000	IRIS	02/01/17
C5-C8 Aliphatics (used in HHRA)	Chronic	6.0E-02	mg/kg-day	6.0E-02	mg/kg-day	Nervous System	N/A	HEAST	1997
C5-C8 Aliphatics [4]	Chronic	3.0E-01	mg/kg-day	3.0E-01	mg/kg-day	Nervous System	3,000	PPRTV	02/01/17
C9-C12 Aliphatics	Chronic	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	Blood/Kidney/Liver	10,000	PPRTV	02/01/17
C9-C10 Aromatics [5]	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Blood	3000	PPRTV	02/01/17
C9-C18 Aliphatics	Chronic	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	Blood/Kidney/Liver	10,000	PPRTV	02/01/17
C11-C22 Aromatics [5]	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Blood	3000	PPRTV	02/01/17
Benzo(a)pyrene	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Developmental	3000	IRIS	02/01/17
bis(2-Ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg-day	2.0E-02	mg/kg-day	Liver	1000	IRIS	02/01/17
Methylnaphthalene, 2-	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Respiratory	1000	IRIS	02/01/17
Naphthalene	Chronic	2.0E-02	mg/kg-day	2.0E-02	mg/kg-day	Blood	3000	IRIS	02/01/17
PCB TEQ	Chronic	7.0E-10	mg/kg-day	7.0E-10	mg/kg-day	Developmental/Reproductive	30	IRIS	02/01/17
PCB TEQ	Subchronic	7.0E-10	mg/kg-day	7.0E-10	mg/kg-day	Developmental/Reproductive	30	IRIS	02/01/17
Total PCBs	Chronic	2.0E-05	mg/kg-day	2.0E-05	mg/kg-day	Immune System/Skin	300	IRIS	02/01/17
Total PCBs	Subchronic	6.0E-05	mg/kg-day	6.0E-05	mg/kg-day	Immune System/Skin	100	IRIS	02/01/17
4,4'-DDD	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	02/01/17
4,4'-DDE	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	02/01/17
4,4'-DDT	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Liver	100	IRIS	02/01/17
Aldrin	Chronic	3.0E-05	mg/kg-day	3.0E-05	mg/kg-day	Liver	1000	IRIS	02/01/17
alpha-BHC	Chronic	8.0E-03	mg/kg-day	8.0E-03	mg/kg-day	Liver	100	ATSDR	02/01/17
alpha-Chlordane	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Liver	300	IRIS	02/01/17
beta-BHC	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	N/A	N/A	N/A	02/01/17
Dieldrin	Chronic	5.0E-05	mg/kg-day	5.0E-05	mg/kg-day	Liver	100	IRIS	02/01/17
Lindane	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Kidney/Liver	1000	IRIS	02/01/17
gamma-Chlordane	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Liver	300	IRIS	02/01/17
Heptachlor	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Liver	300	IRIS	02/01/17
Heptachlor Epoxide	Chronic	1.3E-05	mg/kg-day	1.3E-05	mg/kg-day	Liver	1000	IRIS	02/01/17
Arsenic	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Skin	3	IRIS	02/01/17
Chromium (VI)	Chronic	3.0E-03	mg/kg-day	7.5E-05	mg/kg-day	GI System	900	IRIS	02/01/17
Cobalt	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Endocrine	3000	PPRTV	02/01/17
Iron	Chronic	7.0E-01	mg/kg-day	7.0E-01	mg/kg-day	GI System	2	PPRTV	02/01/17
Lead	Chronic	N/A	mg/kg-day	N/A	mg/kg-day	Nervous System	N/A	N/A	02/01/17
Manganese	Chronic	2.4E-02	mg/kg-day	9.6E-04	mg/kg-day	Nervous System	3	IRIS	02/01/17
Thallium	Chronic	1.0E-05	mg/kg-day	1.0E-05	mg/kg-day	Skin	3000	PPRTV	02/01/17

Table G-6

Non-Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC: RfD: Target Organ	Dates (MM/DD/YYYY)
Benzene	Chronic	3.0E-02	mg/m^3	N/A	N/A	Immune System	300	IRIS	02/01/17
Dichlorobenzene, 1,4-	Chronic	8.0E-01	mg/m^3	N/A	N/A	Liver	100	IRIS	02/01/17
Dichloroethane, 1,1-	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Dichloroethane, 1,2-	Chronic	7.0E-03	mg/m^3	N/A	N/A	Nervous System	3000	PPRTV	02/01/17
Dichloroethene, 1,1-	Chronic	2.0E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	02/01/17
Dichloroethene, cis-1,2-	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Dichloroethene, cis-1,2-	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Dichloroethene, trans-1,2- (3)	Chronic	6.0E-02	mg/m^3	N/A	N/A	Respiratory/Liver	3000	PPRTV	03/01/14
Dioxane, 1,4-	Chronic	3.0E-02	mg/m^3	N/A	N/A	Respiratory	1000	IRIS	02/01/17
Ethylbenzene	Chronic	1.0E+00	mg/m^3	N/A	N/A	Developmental	300	IRIS	02/01/17
Methyl tert-Butyl Ether	Chronic	3.0E+00	mg/m^3	N/A	N/A	Liver/Kidney	100	IRIS	02/01/17
Methylene Chloride	Chronic	6.0E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	02/01/17
Tetrachloroethylene	Chronic	4.0E-02	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	02/01/17
Tetrachloroethylene	Subchronic	4.0E-02	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	02/01/17
Trichlorobenzene, 1,2,3-	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Trichlorobenzene, 1,2,4-	Chronic	2.0E-03	mg/m^3	N/A	N/A	Liver	3000	PPRTV	02/01/17
Trichloroethane, 1,1,1-	Chronic	5.0E+00	mg/m^3	N/A	N/A	Liver	100	IRIS	02/01/17
Trichloroethane, 1,1,2-	Chronic	2.0E-04	mg/m^3	N/A	N/A	Respiratory	3000	PPRTV	02/01/17
Trichloroethylene	Chronic	2.0E-03	mg/m^3	N/A	N/A	Cardiovascular/Endocrine	10 to 1000	IRIS	02/01/17
Trichloroethylene	Subchronic	2.0E-03	mg/m^3	N/A	N/A	Cardiovascular/Endocrine	10 to 1000	IRIS	02/01/17
Vinyl Chloride	Chronic	1.0E-01	mg/m^3	N/A	N/A	Liver	30	IRIS	02/01/17
Xylenes (total)	Chronic	1.0E-01	mg/m^3	N/A	N/A	Nervous System	300	IRIS	02/01/17
C5-C8 Aliphatics	Chronic	6.0E-01	mg/m^3	N/A	N/A	Respiratory	30	PPRTV	02/01/17
C9-C12 Aliphatics	Chronic	1.0E-01	mg/m^3	N/A	N/A	Respiratory	100	PPRTV	02/01/17
C9-C10 Aromatics (5)	Chronic	1.0E-01	mg/m^3	N/A	N/A	Kidney	1000	PPRTV	02/01/17
C9-C18 Aliphatics	Chronic	1.0E-01	mg/m^3	N/A	N/A	Respiratory	100	PPRTV	02/01/17
C11-C22 (5)	Chronic	1.0E-01	mg/m^3	N/A	N/A	Kidney	1000	PPRTV	02/01/17
Benzo(a)pyrene	Chronic	2.0E-06	mg/m^3	N/A	N/A	Developmental	3000	IRIS	02/01/17
bis(2-Ethylhexyl)phthalate	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Methylnaphthalene, 2- (2)	Chronic	3.0E-03	mg/m^3	N/A	N/A	Respiratory	3000	IRIS	02/01/17
Naphthalene	Chronic	3.0E-03	mg/m^3	N/A	N/A	Respiratory	3000	IRIS	02/01/17
PCB TEQ (6)	Chronic	4.0E-08	mg/m^3	N/A	N/A	Immune System/Skin	100	CalEPA	02/01/17
PCB TEQ (6)	Subchronic	4.0E-08	mg/m^3	N/A	N/A	Immune System/Skin	100	CalEPA	02/01/17
Total PCBs (6)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Total PCBs (6)	Subchronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
4,4'-DDD	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
4,4'-DDE	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
4,4'-DDT	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Aldrin (6)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
alpha-BHC	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
alpha-Chlordane (6)	Chronic	7.0E-04	mg/m^3	N/A	N/A	Liver	1000	IRIS	02/01/17
beta-BHC	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Dieldrin	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Lindane	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
gamma-Chlordane (6)	Chronic	7.0E-04	mg/m^3	N/A	N/A	Liver	1000	IRIS	02/01/17
Heptachlor (6)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Heptachlor Epoxide (6)	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Arsenic	Chronic	1.5E-05	mg/m^3	N/A	N/A	Developmental	30	CalEPA	02/01/17
Chromium (VI)	Chronic	1.0E-04	mg/m^3	N/A	N/A	Respiratory	300	IRIS	02/01/17
Cobalt	Chronic	6.0E-06	mg/m^3	N/A	N/A	Respiratory	300	PPRTV	02/01/17
Iron	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Lead	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17
Manganese	Chronic	5.0E-05	mg/m^3	N/A	N/A	Nervous System	1000	IRIS	02/01/17
Thallium	Chronic	N/A	mg/m^3	N/A	N/A	N/A	N/A	N/A	02/01/17

Key

N/A - No information available

Table G-6

Non-Cancer Toxicity Data Summary

IRIS: Integrated Risk Information System, U.S. EPA
PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC
HEAST = Health Effects Assessment Summary Tables
CalEPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment
ATSDR = Agency for Toxic Substances and Disease Registry
PCB - Polychlorinated biphenyl.
TEQ - Toxicity equivalent.

(1) Date indicates when source was last reviewed.
(2) The RfC for naphthalene was used as a surrogate for 2-methylnaphthalene in the BHHRA, but has not been utilized for development of cleanup levels.
(3) The RfC for trans-1,2-dichloroethene has been withdrawn from the PPRTV database.
(4) The HEAST chronic RfD for n-hexane was used for the C5-C8 aliphatic fraction in the baseline HHRA, but has been withdrawn. The PPRTV subchronic RfD for n-hexane has been utilized as the chronic RfD for the development of cleanup levels for the C5-C8 aliphatic fraction.
(5) The RfD/RfC for C9-C10 aromatics and C11-C22 aromatics (high flash aromatic naphtha) from the PPRTV database was used for the BHHRA and cleanup level development. This approach is consistent with that recommended in instances where target compounds (naphthalene, 2-methylnaphthalene, trimethylbenzenes) have been characterized separately.
(6) Aldrin, chlordane, 4,4'-DDE, heptachlor, heptachlor epoxide, total PCBs and PCB TEQ were not classified as volatile at the time of the BHHRA, but have since been re-classified as volatile (USEPA, 2015). The RfC, if available, has been utilized during development of cleanup levels.

The RfD for Aroclor 1254 was used as a surrogate for Aroclor 1260 (High risk and persistence; upper-bound slope factor).
The RfD and/or RfC for benzo(a)pyrene, 2-methylnaphthalene, trans-1,2-dichloroethene, and C5-C8 aliphatics have been updated since the baseline HHRA. Results presented on Risk Summary tables use the current toxicity values and exposure parameters from the baseline HHRA. Refer to Attachment 2 of the July 2017 FS Study Report Addendum for a discussion of the results based on updated toxicity values.

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil, sediment, and groundwater. Forty-four of the COCs have oral toxicity data (or surrogate toxicity data) indicating their potential for adverse non-carcinogenic health effects in humans. Chronic toxicity data available for the forty-three COCs for oral exposures have been used to develop chronic oral reference doses (RfDs), provided in this table. The available chronic toxicity data indicate that benzene, trichloroethene, trans-1,2-dichloroethene and PCBs affect the immune system, 1,4-dichlorobenzene, 1,1-dichloroethene, 1,4-dioxane, ethylbenzene, methylene chloride, 1,2,3-trichlorobenzene, 1,1,1-trichloroethene, 1,1,2-trichloroethane, vinyl chloride, C9-C12 aliphatics, C9-C18 aliphatics, bis(2-ethylhexyl)phthalate, 4,4'-DDT, aldrin, alpha-BHC, chlordane, dieldrin, lindane, heptachlor, and heptachlor epoxide affect the liver, 1,1-dichloroethane, 1,2-dichloroethane, cis-1,2-dichloroethene, 1,4-dioxane, ethylbenzene, C9-C12 aliphatics, C9-C18 aliphatics, and lindane affect the kidney, tetrachloroethene, xylene, C5-C8 aliphatics and manganese affect the central nervous system, trichloroethene, benzo(a)pyrene and PCB TEQ are developmental toxicants, hexavalent chromium and iron affect the gastrointestinal system, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics and naphthalene the blood, and 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, and cobalt affect the endocrine system, trichloroethylene affects the cardiovascular system, PCB TEQ affects the reproductive system, and C9-C10 aromatics, C11-C22 aromatics, and 2 methylnaphthalene affects the respiratory system, and total PCBs, arsenic and thallium affect the skin. Dermal RfDs are not available for any of the COCs. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. Oral RfDs were adjusted for COCs with less than 50% absorption via the ingestion route (hexavalent chromium and manganese) to derive dermal RfDs for these COCs. Inhalation reference concentrations (RfCs) are available for thirty-one COCs evaluated for the inhalation pathway.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-7

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk					
				Ingestion	Inhalation	Dermal	External (Radiation)	Produce Ingestion	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property						- -	
			Vinyl Chloride	7E-06	- -	- -	- -	- -	7E-06
			Trichloroethylene	4E-06	- -	- -	- -	- -	4E-06
			bis(2-Ethylhexyl)phthalate	2E-06	- -	9E-07	- -	- -	3E-06
								- -	
			alpha-Chlordane	2E-05	- -	3E-06	- -	- -	2E-05
			gamma-Chlordane	3E-05	- -	3E-06	- -	- -	3E-05
			alpha-BHC	2E-05	- -	7E-06	- -	- -	3E-05
			Heptachlor	2E-04	- -	5E-05	- -	- -	2E-04
			Heptachlor Epoxide	3E-06	- -	8E-07	- -	- -	3E-06
			Dieldrin	2E-05	- -	6E-06	- -	- -	2E-05
			4,4'-DDD	1E-06	- -	4E-07	- -	- -	2E-06
			4,4'-DDT	2E-06	- -	2E-07	- -	- -	3E-06
								- -	
			Total PCBs	3E-04	- -	1E-04	- -	- -	4E-04
			PCB TEQ	3E-04	- -	3E-05	- -	- -	3E-04
								- -	
			Arsenic	2E-05	- -	2E-06	- -	- -	2E-05
			Chromium (VI)	4E-06	- -	N/A	- -	- -	4E-06
								Subsurface Soil Risk Total =	1E-03
								Total Risk =	1E-03

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

This table provides risk estimates for the significant routes of exposure for future young child and adult recreational user exposed to subsurface soil at the Whitney Property. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about exposure to subsurface soil by a young child and adult recreational user, as well as the toxicity of the COCs (vinyl chloride, trichloroethylene, bis(2-ethylhexyl)phthalate, total PCBs, PCB TEQ, chlordane, alpha-BHC, heptachlor, heptachlor epoxide, dieldrin, 4,4'-DDD, 4,4'-DDT, arsenic, and hexavalent chromium). The total risk from exposure to soil for a future recreational user is estimated to be 1 x 10^{-3} (Whitney Property subsurface soil). The COCs contributing most to this risk level are heptachlor, total PCBs, and PCB TEQ. This risk level indicates that if no clean-up action is taken, a young child and adult recreational user would have an increased probability of 3 in 1,000 (Whitney Property subsurface soil) of developing cancer as a result of site-related exposure to the COCs in soil. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-8

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Whitney Property	Total PCBs	Immune System/Skin	1E+00	- -	5E-01	2E+00
							Surface Soil Hazard Index Total =	2E+00
							Immune System Hazard Index =	2E+00
Soil	Subsurface Soil	Whitney Property	Total PCBs	Immune System/Skin	6E+01	- -	2E+01	8E+01
			PCB TEQ	Developmental/Reproductive	3E+01	- -	2E+00	3E+01
							Subsurface Soil Hazard Index Total =	1E+02
							Developmental Hazard Index =	3E+01
							Reproductive Hazard Index =	3E+01
							Skin Hazard Index =	8E+01
							Immune System Hazard Index =	8E+01
Soil	Surface Soil	Murphy Property	Thallium	Skin	2E+00	- -	N/A	2E+00
							Surface Soil Hazard Index Total =	2E+00
							Skin Hazard Index =	2E+00
Soil	Subsurface Soil	Murphy Property	Thallium	Skin	2E+00	- -	N/A	2E+00
							Subsurface Soil Hazard Index Total =	2E+00
							Skin Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for future young child and adult recreational user exposed to surface and subsurface soil at the following Areas of Interest: Whitney Property and Murphy Property. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 80 indicate that the potential for adverse effects could occur from exposure to contaminated soil containing total PCBs, PCB TEQ and thallium. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-9

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	Whitney Property	Total PCBs	Immune System/Skin	1E+01	- -	5E+00	2E+01
			PCB TEQ	Developmental/Reproductive	2E+01	4E-06	1E+00	2E+01
							Subsurface Soil Hazard Index Total =	3E+01
							Developmental Hazard Index =	2E+01
							Reproductive Hazard Index =	2E+01
							Skin Hazard Index =	2E+01
							Immune System Hazard Index =	2E+01
Groundwater	Shallow Groundwater	Whitney Property	Dichloroethene, cis-1,2-	Kidney	4E-01	- -	3E+00	3.1E+00
			Tetrachloroethylene	Nervous System	8E-02	- -	2E+00	1.7E+00
			Trichloroethylene	Cardiovascular/Developmental/ Immune System	2E+00	- -	1E+01	1.5E+01
							Shallow Groundwater Hazard Index Total =	2E+01
							Kidney Hazard Index =	3E+00
							Nervous System Hazard Index =	2E+00
							Cardiovascular System Hazard Index =	2E+01
							Developmental Hazard Index =	2E+01
							Immune System Hazard Index =	2E+01
Groundwater	Shallow Groundwater	Murphy Property	Dichloroethene, cis-1,2-	Kidney	3E-01	- -	2E+00	2E+00
							Shallow Groundwater Hazard Index Total =	2E+00
							Kidney Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a future adult construction worker exposed to subsurface soil and shallow groundwater at the Whitney Property and shallow groundwater at the Murphy Property. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 20 indicate that the potential for adverse effects could occur from exposure to contaminated soil containing total PCBs and PCB TEQ, and contaminated shallow groundwater containing cis-1,2-dichloroethene, tetrachloroethylene, and trichloroethylene. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-10								
Risk Characterization Summary - Non-Carcinogens								
Scenario Timeframe: Future **Receptor Population: Trespasser** **Receptor Age: Older Child/Adolescent**								
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Primary Target Organ**	**Non-Carcinogenic Hazard Quotient**			
					Ingestion	**Inhalation**	**Dermal**	**Exposure Routes Total**
Sediment	Sediment	Murphy Wetland	Total PCBs	Immune System/Skin	5E-01	- -	1E+00	2E+00
							Sediment Hazard Index Total =	2E+00
							Skin Hazard Index =	2E+00
							Immune System Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

PCB - Polychlorinated biphenyl.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a future older child/adolescent trespasser exposed to sediment at the Murphy Wetland. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HI of 2 indicates that the potential for adverse effects could occur from exposure to contaminated sediment containing total PCBs. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-11								
Risk Characterization Summary - Non-Carcinogens								
Scenario Timeframe: Future **Receptor Population: Recreational User** **Receptor Age: Young Child/Adult**								
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Primary Target Organ**	**Non-Carcinogenic Hazard Quotient**			
					Ingestion	**Inhalation**	**Dermal**	**Exposure Routes Total**
Sediment	Sediment	Murphy Wetland	Total PCBs	Immune System/Skin	5E+00	- -	4E+00	1E+01
			C11-C22 Aromatics	Blood	1E+00	- -	7E-01	2E+00
							Sediment Soil Hazard Index Total =	1E+01
							Skin Hazard Index =	1E+01
							Blood Hazard Index =	2E+00
							Immune System Hazard Index =	1E+01

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

PCB - Polychlorinated biphenyl.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a future young child/adult recreational user exposed to sediment at the Murphy Wetland. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 10 indicate that the potential for adverse effects could occur from exposure to contaminated sediment containing total PCBs and C11-C22 aromatics. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-12								
Risk Characterization Summary - Carcinogens								
Scenario Timeframe: Future **Receptor Population: Resident** **Receptor Age: Young Child/Adult**								
Medium	**Exposure Medium**	**Exposure Point**	**Chemical of Concern**	**Carcinogenic Risk**				
				Ingestion	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Routes Total**
Groundwater	Tap Water	SWP-Wide						
			Benzene	4E-05	9E-05	7E-06	- -	1E-04
			Dichlorobenzene, 1,4-	3E-06	8E-05	2E-06	- -	9E-05
			Dichloroethane, 1,1-	1E-04	4E-04	8E-06	- -	5E-04
			Dichloroethane, 1,2-	9E-06	4E-05	5E-07	- -	5E-05
			Dioxane, 1,4-	1E-04	8E-05	4E-07	- -	2E-04
			Ethylbenzene	2E-05	6E-05	1E-05	- -	9E-05
			Methyl tert-Butyl Ether	2E-06	5E-06	5E-08	- -	7E-06
			Methylene Chloride	1E-04	8E-06	5E-06	- -	2E-04
			Tetrachloroethylene	6E-05	1E-04	4E-05	- -	2E-04
			Trichlorobenzene, 1,2,4-	7E-05	- -	1E-04	- -	2E-04
			Trichloroethane, 1,1,2-	6E-07	2E-06	4E-08	- -	3E-06
			Trichloroethylene	4E-03	5E-03	6E-04	- -	9E-03
			Vinyl Chloride	2E-01	8E-03	1E-02	- -	2E-01
			Benzo(a)pyrene	3E-05	- -	- -	- -	3E-05
			Naphthalene	- -	2E-03	- -	- -	2E-03
			PCB TEQ	2E-04	- -	- -	- -	2E-04
			Total PCBs	8E-04	- -	- -	- -	8E-04
			4,4'-DDD	3E-06	- -	3E-05	- -	3E-05
			4,4'-DDT	2E-06	- -	- -	- -	2E-06
			Aldrin	6E-05	- -	1E-03	- -	1E-03
			alpha-BHC	3E-04	- -	5E-04	- -	7E-04
			alpha-Chlordane	2E-06	- -	1E-05	- -	2E-05
			beta-BHC	1E-05	- -	2E-05	- -	3E-05
			Dieldrin	5E-06	- -	3E-05	- -	3E-05
			Lindane	9E-05	- -	1E-04	- -	2E-04
			gamma-Chlordane	2E-06	- -	1E-05	- -	1E-05
			Heptachlor	4E-05	- -	3E-04	- -	4E-04
			Heptachlor Epoxide	3E-05	- -	1E-04	- -	2E-04
			Arsenic	9E-03	- -	5E-05	- -	9E-03
							Groundwater Risk Total =	3E-01
							Total Risk =	3E-01

Key

-- Route of exposure is not applicable to this medium.

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

This table provides risk estimates for the significant routes of exposure for the future young child and adult resident exposed to groundwater used as tap (household) water. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a young child's and adult's exposure to groundwater, as well as the toxicity of the COCs (benzene, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,4-dioxane, ethylbenzene, methyl tert-butyl ether, methylene chloride, tetrachloroethylene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethylene, vinyl chloride, benzo(a)pyrene, naphthalene, total PCBs, PCB TEQ, 4,4'-DDD, 4,4'-DDT, aldrin, alpha-BHC, chlordane, beta-BHC, dieldrin, lindane, heptachlor. heptachlor epoxide, and arsenic). The total risk from direct exposure to contaminated groundwater to a future resident, in the event that SWP-Wide groundwater is used as a potable source, is estimated to be 3×10^{-1}. The COCs contributing most to these risk levels are trichloroethylene, vinyl chloride, naphthalene, aldrin, and arsenic in groundwater. This risk level indicates that if no clean-up action is taken, a future child/adult resident would have an increased probability of 3 in 10 of developing cancer as a result of site-related exposure to the COCs in groundwater. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-13

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Tap Water	SWP-Wide						
			Benzene	Immune System	9E-01	9E-01	1E-01	2E+00
			Dichloroethene, cis-1,2-	Kidney	1E+03	- -	1E+02	1E+03
			Methylene Chloride	Liver	2E+01	1E+00	6E-01	2E+01
			Tetrachloroethylene	Nervous System	2E+01	2E+01	1E+01	6E+01
			Trichlorobenzene, 1,2,3-	Endocrine/Liver	4E+00	- -	6E+00	1E+01
			Trichlorobenzene, 1,2,4-	Endocrine/Liver	1E+00	4E+01	1E+00	4E+01
			Trichloroethane, 1,1,2-	Liver/Respiratory	1E-02	2E+00	8E-04	2E+00
			Trichloroethylene	Cardiovascular/Developmental/ Endocrine/Immune System	5E+02	1E+03	8E+01	2E+03
			Vinyl Chloride	Liver	6E+01	1E+01	4E+00	7E+01
			Xylenes (total)	Nervous System	2E-01	2E+00	9E-02	3E+00
			C5-C8 Aliphatics	Nervous System/Respiratory	5E+00	4E+00	6E+00	1E+01
			C9-C12 Aliphatics	Blood/Kidney/Liver/Respiratory	6E-01	4E-01	5E+00	6E+00
			C9-C10 Aromatics	Blood/Kidney	2E+00	5E+00	2E+00	9E+00
			C9-C18 Aliphatics	Blood/Kidney/Liver/Respiratory	9E-01	7E-01	1E+01	1E+01
			C11-C22 Aromatics	Blood/Kidney	1E+00	3E+00	5E+00	9E+00
			Methylnaphthalene, 2-	Respiratory	1E+00	1E+01	2E+00	2E+01
			Naphthalene	Blood/Respiratory	1E+00	5E+01	7E-01	6E+01
			PCB TEQ	Developmental/Immune System/Reproductive/Skin	1E+01	- -	- -	1E+01
			Total PCBs	Immune System/Skin	8E+01	- -	- -	8E+01
			Aldrin	Liver	5E-01	- -	9E+00	9E+00
			Lindane	Kidney/Liver	1E+00	- -	9E-01	2E+00
			Heptachlor Epoxide	Liver	9E-01	- -	6E-01	2E+00
			Arsenic	Developmental/Skin	8E+01	- -	5E-01	8E+01
			Cobalt	Endocrine/Respiratory	3E+00	- -	9E-03	3E+00
			Iron	GI System	3E+00	- -	2E-02	3E+00
			Manganese	Nervous System	1E+01	- -	2E+00	2E+01
							Groundwater Hazard Index Total =	3E+03
							Skin Hazard Index =	2E+02
							Immune System Hazard Index =	2E+03
							Developmental Hazard Index =	2E+03
							Kidney Hazard Index =	1E+03
							Liver Hazard Index =	2E+02
							Respiratory Hazard Index =	1E+02
							Endocrine Hazard Index =	2E+03
							Cardiovascular Hazard Index =	2E+03
							GI System Hazard Index =	3E+00
							Nervous System Hazard Index =	9E+01
							Blood Hazard Index =	9E+01

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

PCB - Polychlorinated biphenyl.

TEQ - Toxicity equivalent.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future young child and adult resident exposed to groundwater used as tap (household) water. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 3 and 2,000 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing benzene, cis-1,2-dichloroethene, methylene chloride, tetrachloroethylene, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethylene, vinyl chloride, xylenes, C5-C8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, C9-C18 aliphatics, C11-C22 aromatics, 2-methylnaphthalene, naphthalene, PCB TEQ, total PCBs, aldrin, lindane, heptachlor epoxide, arsenic, cobalt, iron, and manganese. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-14

Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern (COPECs)
Seasonally Ponded Area

Medium: Surface Water

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPEC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Metals, Total (mg/L)								
Aluminum	1 / 3	0.244 - 0.244	0.169	0.087	Yes	ASL	2.8	1.9
Barium	3 / 3	0.019 - 0.085	0.0597	0.22	No	BSL	-	-
Calcium	3 / 3	14.8 - 61.0	42.4	116	No	BSL	-	-
Chromium	3 / 3	0.0052 - 0.023	0.0114	0.105	No	BSL	-	-
Cobalt	2 / 3	0.0017 - 0.0026	0.0019	0.024	No	BSL	-	-
Cyanide	2 / 3	0.006 - 0.009	0.006	0.0052	Yes	ASL	1.7	1.2
Iron	3 / 3	0.318 - 2.77	1.42	1.0	Yes	ASL	2.8	1.4
Magnesium	3 / 3	2.49 - 6.11	4.74	82.0	No	BSL	-	-
Manganese	3 / 3	0.063 - 0.545	0.275	0.120	Yes	ASL	4.5	2.3
Nickel	2 / 3	0.0027 - 0.004	0.0027	0.0639	No	BSL	-	-
Potassium	3 / 3	3.35 - 10.3	7.95	53.0	No	BSL	-	-
Sodium	3 / 3	21.7 - 82.0	54.2	680	No	BSL	-	-
Vanadium	2 / 3	0.0017 - 0.002	0.0017	0.012	No	BSL	-	-
Metals, Dissolved (mg/L)								
Barium	3 / 3	0.018 - 0.083	0.059	0.22	No	BSL	-	-
Calcium	3 / 3	14.4 - 61.5	42.9	116	No	BSL	-	-
Chromium	3 / 3	0.0028 - 0.0055	0.0043	0.090	No	BSL	-	-
Cobalt	1 / 3	0.0018 - 0.0018	0.0015	0.024	No	BSL	-	-
Iron	3 / 3	0.259 - 2.84	1.39	1.0	Yes	ASL	2.8	1.4
Magnesium	3 / 3	2.45 - 6.35	4.85	82.0	No	BSL	-	-
Manganese	3 / 3	0.060 - 0.548	0.278	0.120	Yes	ASL	4.6	2.3
Nickel	2 / 3	0.0023 - 0.0038	0.0025	0.0637	No	BSL	-	-
Potassium	3 / 3	3.93 - 11.1	8.71	53.0	No	BSL	-	-
Sodium	3 / 3	22.1 - 81.0	51.5	680	No	BSL	-	-
Vanadium	1 / 3	0.0017 - 0.0017	0.0015	0.012	No	BSL	-	-

Notes:

[a] Average (arithmetic mean) was calculated using the detection limit for non detects.

[b] Screening benchmarks were selected in SLERA Table 4-5. Where applicable, benchmarks were adjusted based on measured hardness of 12.7 mg/L as $CaCO_3$.

[c] Chemical is selected as a chemical of potential ecological concern (COPEC) if the maximum detected concentration is greater than the screening benchmark.

ASL - Above Screening Level

BSL - Below Screening Level. Not retained as COPEC.

[d] Maximum hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPECs.

[e] Average HQ is the average detected concentration divided by the screening benchmark.

mg/L - milligrams per liter

Table G-15

Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern (COPECs)
Seasonally Ponded Area

Medium: Wetland Sediment

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPEC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Volatile Organics (mg/Kg)								
2-Butanone (MEK)	1 / 5	0.145 - 0.145	7.9	0.042	Yes	ASL	3.5	188
Acetone	1 / 5	0.485 - 0.485	8.0	0.010	Yes	ASL	49	802
Carbon disulfide	1 / 5	0.017 - 0.017	3.9	0.024	No	BSL	-	-
Ethylbenzene	2 / 5	0.007 - 53	11	0.175	Yes	ASL	303	61
Ethylene dibromide	1 / 4	9.5 - 9.5	2.5		Yes	NSL	NA	NA
Methyl tert-butyl ether	1 / 5	0.115 - 0.115	3.9		Yes	NSL	NA	NA
Toluene	1 / 5	0.14 - 0.14	2.0	1.22	No	BSL	-	-
Semivolatile Organics (mg/Kg)								
2-Methylnaphthalene	1 / 10	0.0425 - 0.0425	0.80	0.020	Yes	ASL	2.1	40
2-Methylphenol	2 / 5	0.0051 - 0.15	0.15	0.012	Yes	ASL	13	12
Acenaphthene	4 / 11	0.019 - 0.15	1.2	0.007	Yes	ASL	21	174
Acenaphthylene	3 / 11	0.0181 - 0.025	1.3	0.006	Yes	ASL	4.2	210
Acetophenone	2 / 5	2.4 - 4.95	1.8		Yes	NSL	NA	NA
Anthracene	3 / 11	0.23 - 0.52	1.3	0.057	Yes	ASL	9.1	23
Benzaldehyde	3 / 5	0.19 - 1.56	0.50		Yes	NSL	NA	NA
Benzo(a)anthracene	9 / 11	0.32 - 3.1	1.3	0.108	Yes	ASL	29	12
Benzo(a)pyrene	9 / 11	0.38 - 3.3	1.3	0.150	Yes	ASL	22	9.0
Benzo(b)fluoranthene	8 / 11	0.38 - 2.9	1.3	10.4	No	BSL	-	-
Benzo(g,h,i)perylene	9 / 11	0.135 - 4.6	1.6	0.170	Yes	ASL	27	9.5
Benzo(k)fluoranthene	9 / 11	0.19 - 3.3	1.5	0.240	Yes	ASL	14	6.3
Bis(2-ethylhexyl)phthalate	3 / 6	0.36 - 0.64	0.93	0.182	Yes	ASL	3.5	5.1
Carbazole	2 / 4	0.12 - 0.23	0.31		Yes	NSL	NA	NA
Chrysene	9 / 11	0.47 - 3.6	1.4	0.166	Yes	ASL	22	8.3
Dibenz(a,h)anthracene	7 / 11	0.068 - 1.3	0.66	0.033	Yes	ASL	39	20
Fluoranthene	9 / 11	0.6 - 5.4	1.9	0.423	Yes	ASL	13	4.5
Fluorene	5 / 11	0.014 - 0.7	1.2	0.077	Yes	ASL	9.1	15
Indeno(1,2,3-cd)pyrene	9 / 11	0.0725 - 3.2	1.4	0.200	Yes	ASL	16	7.0
Naphthalene	3 / 11	0.046 - 0.0745	1.1	0.176	No	BSL	-	-
Phenanthrene	5 / 11	0.27 - 1.85	1.5	0.204	Yes	ASL	9.1	7.4
Phenol	3 / 5	0.19 - 10.1	2.2	0.049	Yes	ASL	206	44
Pyrene	9 / 11	0.6 - 5.7	1.9	0.195	Yes	ASL	29	9.8
PCBs (mg/Kg)								
PCB Congeners								
PCB 105	5 / 5	0.00202 - 0.2445	0.062636		Yes	NSL	NA	NA
PCB 114	5 / 5	0.000116 - 0.010475	0.002680		Yes	NSL	NA	NA
PCB 118	5 / 5	0.00368 - 0.563	0.150706		Yes	NSL	NA	NA
PCB 123	5 / 5	0.000719 - 0.079275	0.017287		Yes	NSL	NA	NA
PCB 126	5 / 5	0.000115 - 0.001515	0.000584		Yes	NSL	NA	NA
PCB 156/157	5 / 5	0.002024 - 0.074385	0.021479		Yes	NSL	NA	NA
PCB 167	5 / 5	0.001 - 0.02449	0.007580		Yes	NSL	NA	NA
PCB 170	2 / 2	0.017 - 0.0356	0.026300		Yes	NSL	NA	NA
PCB 189	5 / 5	0.000239 - 0.00314	0.001126		Yes	NSL	NA	NA
PCB 193/180	2 / 2	0.0331 - 0.0641	0.048600		Yes	NSL	NA	NA
PCB 77	5 / 5	0.000489 - 0.007995	0.003093		Yes	NSL	NA	NA
PCB 81	3 / 5	0.0000393 - 0.001855	0.000545		Yes	NSL	NA	NA

Table G-15

Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern (COPECs)
Seasonally Ponded Area

Medium: Wetland Sediment

Analyte	Frequency of Detection			Range of Detected Concentrations			Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPEC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Aroclor 1254	25	/	41	0.311	-	220	17	0.060	Yes	ASL	3,667	290
Aroclor 1260	15	/	39	0.109	-	450	17	0.060	Yes	ASL	7,500	277
Total PCBs	37	/	41	0.109	-	450	30	0.060	Yes	ASL	7,500	495
Pesticides (mg/Kg)												
4,4'-DDD	2	/	5	0.0289	-	0.0462	4.0	0.0049	Yes	ASL	9.4	857
4,4'-DDE	2	/	5	0.0046	-	0.0077	4.0	0.0032	Yes	ASL	2.4	1,250
4,4'-DDT	3	/	5	0.0171	-	0.0924	4.0	0.0042	Yes	ASL	22	960
alpha-Chlordane	3	/	3	0.0072	-	0.0359	0.021	0.0032	Yes	ASL	11	6.7
gamma-Chlordane	3	/	3	0.013	-	0.0523	0.039	0.0032	Yes	ASL	16	12
Inorganics (mg/Kg)												
Aluminum	5	/	5	10,700	-	23,500	15,370	25,500	No	BSL	-	-
Antimony	5	/	5	1.1	-	117	25	2.00	Yes	ASL	59	12
Arsenic	5	/	7	5.6	-	17	11	9.79	Yes	ASL	1.7	1.1
Barium	5	/	5	135	-	500	319		Yes	NSL	NA	NA
Beryllium	3	/	5	0.58	-	1.0	0.70		Yes	NSL	NA	NA
Cadmium	5	/	7	1.1	-	4.5	2.3	0.99	Yes	ASL	4.5	2.3
Calcium	5	/	5	3,940	-	23,000	10,120		Yes	NSL	NA	NA
Chromium	45	/	45	48	-	66,500	5,893	43.4	Yes	ASL	1,532	136
Chromium (VI)	31	/	46	2.2	-	365.8	30		Yes	NSL	NA	NA
Cobalt	5	/	5	8.19	-	12	9.6	50.0	No	BSL	-	-
Copper	5	/	5	43	-	160	81	31.6	Yes	ASL	5.1	2.5
Cyanide	4	/	7	0.3	-	2.28	1.0	0.100	Yes	ASL	23	10
Iron	5	/	5	14,500	-	28,300	21,960	20,000	Yes	ASL	1.4	1.1
Lead	43	/	43	70	-	35,100	2,955	35.8	Yes	ASL	980	83
Magnesium	5	/	5	4,370	-	7,050	5,570		Yes	NSL	NA	NA
Manganese	5	/	5	176	-	380	283	460	No	BSL	-	-
Mercury	3	/	5	0.18	-	1.13	0.43	0.18	Yes	ASL	6.3	2.4
Nickel	5	/	5	25	-	41.5	30	22.7	Yes	ASL	1.8	1.3
Potassium	5	/	5	1360	-	6,400	3,497		Yes	NSL	NA	NA
Selenium	2	/	5	0.255	-	0.51	0.81	2.00	No	BSL	-	-
Silver	2	/	5	0.17	-	0.32	0.43	0.50	No	BSL	-	-
Sodium	3	/	5	180	-	880	400		Yes	NSL	NA	NA
Thallium	1	/	5	0.19	-	0.19	0.27		Yes	NSL	NA	NA
Vanadium	5	/	5	36	-	67.5	45		Yes	NSL	NA	NA
Zinc	5	/	5	307.5	-	925	577	121	Yes	ASL	7.6	4.8

Notes:

[a] Average (arithmetic mean) was calculated using the detection limit for non-detects.
[b] Screening benchmarks were selected in SLERA Table 4-6.
[c] Chemical is selected as a chemical of potential ecological concern (COPEC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable.
ASL - Above Screening Level
BSL - Below Screening Level. Not retained as COPEC.
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPECs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.

Table G-15

Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern (COPECs)
Seasonally Ponded Area

Medium: Wetland Sediment

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPEC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]

mg/Kg - milligram per kilogram

Table G-16

Occurrence, Distribution, and Selection of Chemicals of Potential Ecological Concern (COPECs)
Forested/Shrub Area

Medium: Wetland Surface Soil

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPEC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
PCBs (mg/Kg)								
Aroclor 1254	6 / 13	0.4 - 15	2.2	0.00033	Yes	ASL	45,455	6,576
Aroclor 1260	8 / 14	0.2 - 7.9	1.7	0.00033	Yes	ASL	23,939	5,212
Total PCBs	14 / 14	0.2 - 15	3.0	0.00033	Yes	ASL	45,455	9,091
Inorganics (mg/Kg)								
Aluminum	1 / 1	5,500 - 5,500	5,500	pH < 5.5	No	BSL	-	-
Arsenic	1 / 2	12 - 12	16	18	No	BSL	-	-
Barium	1 / 1	46 - 46	46	330	No	BSL	-	-
Beryllium	1 / 1	0.24 - 0.24	0.24	21	No	BSL	-	-
Cadmium	1 / 1	0.7 - 0.7	0.70	0.36	Yes	ASL	1.9	1.9
Calcium	1 / 2	2,200 - 2,200	1,100		Yes	NSL	NA	NA
Chromium	16 / 16	45.1 - 62,500	4,928	26	Yes	ASL	2,404	190
Chromium (VI)	10 / 16	2.09 - 343.75	27	130	Yes	ASL	2.6	0.21
Cobalt	1 / 1	2.4 - 2.4	2.4	13	No	BSL	-	-
Copper	1 / 1	19 - 19	19	28	No	BSL	-	-
Cyanide	1 / 2	0.31 - 0.31	0.63	1.33	No	BSL	-	-
Iron	1 / 1	15,000 - 15,000	15,000	pH < 5.0	No	BSL	-	-
Lead	14 / 14	30 - 3,300	736	11	Yes	ASL	300	67
Magnesium	1 / 1	420 - 420	420		Yes	NSL	NA	NA
Manganese	1 / 1	150 - 150	150	220	No	BSL	-	-
Mercury	1 / 1	0.2 - 0.2	0.20	0.10	Yes	ASL	2.0	2.0
Nickel	1 / 1	8.4 - 8.4	8.4	38	No	BSL	-	-
Potassium	1 / 1	180 - 180	180		Yes	NSL	NA	NA
Selenium	1 / 1	0.99 - 0.99	0.99	0.52	Yes	ASL	1.9	1.9
Silver	1 / 1	0.16 - 0.16	0.16	4.2	No	BSL	-	-
Sodium	1 / 1	85 - 85	85		Yes	NSL	NA	NA
Thallium	1 / 1	0.072 - 0.072	0.072	0.057	Yes	ASL	1.3	1.3
Vanadium	1 / 1	11 - 11	11	7.8	Yes	ASL	1.4	1.4
Zinc	1 / 1	140 - 140	140	46	Yes	ASL	3.0	3.0

Notes:
[a] Average (arithmetic mean) was calculated using the detection limit for non-detects.
[b] Screening benchmarks were selected in SLERA Table 4-7.
[c] Chemical is selected as a chemical of potential ecological concern (COPEC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable.
ASL - Above Screening Level
BSL - Below Screening Level. Not retained as COPEC.
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPECs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.
mg/Kg - milligram per kilogram

Table K-1
Comparative Analysis of Remedial Alternatives
Record of Decision
Wells G&H Superfund Site, Southwest Properties, OU4
Woburn, MA

MEDIUM	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	COSTS		
							Capital Costs	Annual O&M Costs	Present Worth (1)
WHITNEY SOILS (SW)									
Alternative SW-1: No Action	□	□	♦	♦	♦♦♦	♦♦♦	$0	$0	$0
Alternative SW-2: Capping and Institutional Controls	■	□	♦♦	♦	♦♦	♦♦♦	$1,435,250	$357,359	$2,259,085
Alternative SW-3: Soil Excavation, Off-site Disposal, Capping, and Institutional Controls	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$5,284,786	$371,552	$6,977,534
Alternative SW-4: Soil Excavation, Cover, Off-Site Disposal, and Institutional Controls	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$7,579,985	$340,395	$9,815,375
MURPHY SOILS (SM)									
Alternative SM-1: No Action	□	□	♦	♦	♦♦♦	♦♦♦	$0	$0	$0
Alternative SM-2: Capping and Institutional Controls	■	□	♦♦	♦	♦♦	♦♦♦	$1,177,553	$284,828	$1,845,086
Alternative SM-3: Soil Excavation, Off-site Disposal, Capping and Institutional Controls	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$2,009,381	$304,828	$2,967,258
Alternative SM-4: Soil Excavation, Cover, Off-Site Disposal, and Institutional Controls	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$8,350,357	$340,395	$11,404,617
ABERJONA SOILS (SA)									
Alternative SA-1: No Action	□	□	♦	♦	♦♦♦	♦♦♦	$0	$0	$0
Alternative SA-2: Capping and Institutional Controls	■	□	♦♦	♦	♦♦	♦♦♦	$111,800	$10,470	$158,605
Alternative SA-3: Soil Excavation, Off-site Disposal, Capping, and Institutional Controls	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$247,930	$85,470	$413,977
Alternative SA-4: Soil Excavation, Off-Site Disposal, and Institutional Controls	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$400,201	$95,000	$625,266
GROUNDWATER (GW)									
Alternative GW-1: No Action	□	□	♦	♦	♦♦♦	♦♦♦	$0	$0	$0
Alternative GW-2: Institutional Controls	□	□	♦	♦	♦♦♦	♦♦♦	$0	$46,578	$46,578
Alternative GW-3: Monitored Natural Attenuation and Institutional Controls	□	□	♦	♦♦	♦♦♦	♦♦♦	$1,132,757	$46,578	$1,462,525
Alternative GW-4: In Situ Biological Treatment and Institutional Controls	■	■	♦♦	♦♦	♦♦♦	♦♦	$5,332,765	$46,578	$7,112,492
Alternative GW-5: In Situ Chemical Oxidation (ISCO) and Institutional Controls	■	■	♦♦	♦♦	♦♦	♦♦	$21,587,207	$46,578	$27,030,586
Alternative GW-6: Pump and Treat and Institutional Controls	■	■	♦♦♦	♦♦♦	♦♦♦	♦♦♦	$1,794,994	$1,791,434	$4,169,801
NAPL (LN)									
Alternative N-1: No Action	□	□	♦	♦	♦♦♦	♦♦♦	$0	$0	$0
Alternative N-2: NAPL Skimming/Recovery and Institutional Controls	■	■	♦♦	♦♦	♦♦	♦♦	$538,730	$90,395	$763,807
Alternative N-3: Excavation and Off-site Disposal	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$2,645,542	$130,000	$3,436,928
MURPHY WETLAND (WTL)									
Alternative WTL-1: No Action	□	□	♦	♦	♦♦♦	♦♦♦	$0	$0	$0
Alternative WTL-2: Monitored Natural Recovery and Institutional Controls	□	□	♦	♦	♦♦♦	♦♦♦	$150,524	$30,395	$218,549
Alternative WTL-3: Capping, Wetland Mitigation, Monitoring, and Institutional Controls	■	□	♦♦	♦	♦	♦♦♦	$747,950	$46,578	$1,037,612
Alternative WTL-4: Shallow (1 foot) Excavation and Targeted Deeper (3 feet) Excavation, Off-Site Disposal, Amended Cap, Wetland Restoration, Monitoring and Institutional Controls	■	■	♦♦	♦♦	♦♦	♦♦♦	$1,341,660	$101,387	$1,879,086
Alternative WTL-5: Deep (3 feet) Excavation and Off-site Disposal, Backfill, and Wetland Restoration	■	■	♦♦♦	♦♦	♦♦	♦♦♦	$1,522,444	$275,000	$2,178,055

Notes:

□ Fails
◘ Marginally passes
■ Passes

♦ Low
♦♦ Medium
♦♦♦ High

(1) Present Worth = Capital Costs + O&M Costs + Contingency Costs. See Attachment 5 of this FS Report Addendum for Contingency Costs.

Table L-1: Groundwater Cleanup Levels

Carcinogenic Chemical of Concern	Cancer Classification	SWP-Wide Cleanup Level	
		µg/L	Basis
Benzene	A	5	MCL
Dichlorobenzene, 1,4-	NA	75	MCL
Dichloroethane, 1,1-	C	2.8	ILCR = 10^{-6} (Residential)
Dichloroethane, 1,2-	B2	5	MCL
Dioxane, 1,4-	Likely to be carcinogenic to humans	0.46	ILCR = 10^{-6} (Residential)
Ethylbenzene	NA	700	MCL
Methyl tert-Butyl Ether	NA	14	ILCR = 10^{-6} (Residential)
Methylene Chloride	Likely to be carcinogenic to humans	5	MCL
Tetrachloroethene	Likely to be carcinogenic to humans	5	MCL
Trichlorobenzene, 1,2,4-	Likely to be carcinogenic to humans	70	MCL
Trichloroethane, 1,1,2-	C	5	MCL
Trichloroethene	Carcinogenic to Humans	5	MCL
Vinyl Chloride	A	2	MCL
Benzo(a)pyrene	B2	0.2	MCL
Naphthalene	C	0.17	ILCR = 10^{-6} (Residential)
Total PCBs	B2	0.5	MCL
4,4'-DDD	B2	0.032	ILCR = 10^{-6} (Residential)
4,4'-DDE	B2	0.046	ILCR = 10^{-6} (Residential)
4,4'-DDT	B2	0.23	ILCR = 10^{-6} (Residential)
Aldrin	B2	0.001	ILCR = 10^{-6} (Residential)
alpha-BHC	B2	0.007	ILCR = 10^{-6} (Residential)
alpha-Chlordane	B2	2	MCL
beta-BHC	C	0.025	ILCR = 10^{-6} (Residential)
Dieldrin	B2	0.002	ILCR = 10^{-6} (Residential)
Lindane	NA	0.2	MCL
gamma-Chlordane	B2	2	MCL
Heptachlor	B2	0.4	MCL
Heptachlor Epoxide	B2	0.2	MCL
Arsenic	A	10	MCL
Cobalt	Likely to be carcinogenic to humans	6	HQ = 1 (Residential)

Non-Carcinogenic Chemical of Concern	Target Endpoint	Bedrock Cleanup Level	
		µg/L	Basis
Benzene	Immune System	5	MCL
Dichlorobenzene, 1,4-	Liver	75	MCL
Dichloroethane, 1,1-	Kidney	2.8	ILCR = 10^{-6} (Residential)
Dichloroethane, 1,2-	Kidney	5	MCL
Dichloroethene, 1,1-	Liver	7	MCL
Dichloroethene, cis-1,2-	Kidney	70	MCL
Dichloroethene, trans-1,2-	Immune System	100	MCL
Dioxane, 1,4-	Kidney/Liver	0.46	ILCR = 10^{-6} (Residential)
Ethylbenzene	Kidney/Liver	700	MCL
Methylene Chloride	Liver	5	MCL
Tetrachloroethene	Nervous System	5	MCL
Trichlorobenzene, 1,2,3-	Endocrine/Liver	7	HQ = 1 (Residential)
Trichlorobenzene, 1,2,4-	Endocrine	70	MCL
Trichloroethane, 1,1,1-	Liver	200	MCL
Trichloroethane, 1,1,2-	Liver	5	MCL
Trichloroethene	Cardiovascular/Developmental/Immune System	5	MCL
Vinyl Chloride	Liver	2	MCL
Xylenes (total)	Nervous System	10000	MCL
C5-C8 Aliphatics	Nervous System	880	HQ = 1 (Residential)
C9-C12 Aliphatics	Blood/Kidney/Liver	50	Reporting Limit
C9-C10 Aromatics	Respiratory	130	HQ = 1 (Residential)
C9-C18 Aliphatics	Blood/Kidney/Liver	100	Reporting Limit
C11-C22 Aromatics	Respiratory	100	Reporting Limit
Methylnaphthalene, 2-	Respiratory	36	HQ = 1 (Residential)
Naphthalene	Blood	0.17	ILCR = 10^{-6} (Residential)
Total PCBs	Immune System/Skin	0.5	MCL
4,4'-DDT	Liver	0.23	ILCR = 10^{-6} (Residential)
Aldrin	Liver	0.001	ILCR = 10^{-6} (Residential)
alpha-BHC	Liver	0.007	ILCR = 10^{-6} (Residential)
alpha-Chlordane	Liver	2	MCL
Dieldrin	Liver	0.002	ILCR = 10^{-6} (Residential)
Lindane	Kidney/Liver	0.2	MCL
gamma-Chlordane	Liver	2	MCL
Heptachlor	Liver	0.4	MCL
Heptachlor Epoxide	Liver	0.2	MCL
Arsenic	Skin	10	MCL
Cobalt	Endocrine	6	HQ = 1 (Residential)
Iron	GI System	14000	HQ = 1 (Residential)
Lead	Nervous System	15	MCL
Manganese	Nervous System	300	Health Advisory

Key

Health Advisory - Health Advisory on Manganese (EPA-822-R-04-003; January 2004)

See Attachment 2 of the 2017 FS Report Addendum for cleanup level development and basis.

HI - Hazard Index

MCL - Maximum Contaminant Level

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000

NA - Not applicable

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-2: Soil Cleanup Levels for the Protection of Human Health

Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Level[1] mg/kg	Basis[1, 2]
Benzene	A	0.026	Leachability (DAF = 10)
Dichlorobenzene, 1,4-	NA	0.72	Leachability (DAF = 10)
Dichloroethane, 1,1-	C	0.008	Leachability (DAF = 10)
Dichloroethane, 1,2-	B2	0.014	Leachability (DAF = 10)
Dioxane, 1,4-	Likely to be carcinogenic to humans	0.05	Leachability (Reporting Limit)
Ethylbenzene	NA	7.8	Leachability (DAF = 10)
Methyl tert-Butyl Ether	NA	0.05	Leachability (Reporting Limit)
Methylene Chloride	Likely to be carcinogenic to humans	0.013	Leachability (DAF = 10)
Tetrachloroethene	Likely to be carcinogenic to humans	0.023	Leachability (DAF = 10)
Trichlorobenzene, 1,2,4-	Likely to be carcinogenic to humans	0.20	Leachability (DAF = 10)
Trichloroethane, 1,1,2-	C	0.016	Leachability (DAF = 10)
Trichloroethene	Carcinogenic to Humans	0.018	Leachability (DAF = 10)
Vinyl Chloride	A	0.007	Leachability (DAF = 10)
Trichloroethene	Carcinogenic to Humans	39	ILCR = 10^{-6} (Recreational User)
Vinyl chloride	A	0.10	ILCR = 10^{-6} (Recreational User)
bis(2-Ethylhexyl)phthalate	B2	170	ILCR = 10^{-6} (Recreational User)
Naphthalene	C	0.026	Leachability (Reporting Limit)
alpha-Chlordane	B2	8.0	ILCR = 10^{-6} (Recreational User)
gamma-Chlordane	B2	8.0	ILCR = 10^{-6} (Recreational User)
alpha-BHC	B2	0.39	ILCR = 10^{-6} (Recreational User)
Heptachlor	B2	0.69	ILCR = 10^{-6} (Recreational User)
Heptachlor Epoxide	B2	0.34	ILCR = 10^{-6} (Recreational User)
Dieldrin	B2	0.15	ILCR = 10^{-6} (Recreational User)
4,4'-DDD	B2	10	ILCR = 10^{-6} (Recreational User)
4,4'-DDT		8.5	ILCR = 10^{-6} (Recreational User)
Total PCBs	B2	5.3	HQ = 1 (Recreational User)
Arsenic	A	30	ILCR = 10^{-5} (Recreational User)
Chromium (VI)	A	14	ILCR = 10^{-5} (Recreational User)

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Level[1] mg/kg	Basis[1, 2]
Benzene	Immune System	0.026	Leachability (DAF = 10)
Dichlorobenzene, 1,4-	Liver	0.72	Leachability (DAF = 10)
Dichloroethane, 1,1-	Kidney	0.008	Leachability (DAF = 10)
Dichloroethane, 1,2-	Kidney	0.014	Leachability (DAF = 10)
Dichloroethene, 1,1-	Liver	0.025	Leachability (DAF = 10)
Dichloroethene, cis-1,2-	Kidney	0.21	Leachability (DAF = 10)
Dichloroethene, trans-1,2-	Immune System	0.31	Leachability (DAF = 10)
Dioxane, 1,4-	Kidney/Liver	0.05	Leachability (Reporting Limit)
Ethylbenzene	Kidney/Liver	7.8	Leachability (DAF = 10)
Methylene Chloride	Liver	0.013	Leachability (DAF = 10)
Tetrachloroethene	Nervous System	0.023	Leachability (DAF = 10)
Trichlorobenzene, 1,2,3-	Endocrine/Liver	0.12	Leachability (DAF = 10)
Trichlorobenzene, 1,2,4-	Endocrine	0.20	Leachability (DAF = 10)
Trichloroethane, 1,1,1-	Liver	0.70	Leachability (DAF = 10)
Trichloroethane, 1,1,2-	Liver	0.016	Leachability (DAF = 10)
Trichloroethene	Cardiovascular/Developmental/Immune System	0.018	Leachability (DAF = 10)
Vinyl Chloride	Liver	0.007	Leachability (DAF = 10)
Xylenes (total)	Nervous System	98	Leachability (DAF = 10)
Trichloroethene	Cardiovascular/Developmental/Immune System	39	ILCR = 10^{-6} (Recreational User)
Vinyl chloride	Liver	0.10	ILCR = 10^{-6} (Recreational User)
C5-C8 Aliphatics	Nervous System	88	Leachability (DAF = 10)
C9-C12 Aliphatics	Blood/Kidney/Liver	15	Leachability (DAF = 10)
C9-C10 Aromatics	Respiratory	2.7	Leachability (Reporting Limit)
C9-C18 Aliphatics	Blood/Kidney/Liver	15	Leachability (DAF = 10)
C11-C22 Aromatics	Respiratory	6.4	Leachability (Reporting Limit)
bis(2-Ethylhexyl)phthalate	Liver	170	ILCR = 10^{-6} (Recreational User)
Methylnaphthalene, 2-	Respiratory	1.9	Leachability (DAF = 10)
Naphthalene	Blood	0.026	Leachability (Reporting Limit)
alpha-Chlordane	Liver	8.0	ILCR = 10^{-6} (Recreational User)
gamma-Chlordane	Liver	8.0	ILCR = 10^{-6} (Recreational User)
alpha-BHC	Liver	0.39	ILCR = 10^{-6} (Recreational User)
Heptachlor	Liver	0.69	ILCR = 10^{-6} (Recreational User)
Heptachlor Epoxide	Liver	0.34	ILCR = 10^{-6} (Recreational User)
Dieldrin	Liver	0.15	ILCR = 10^{-6} (Recreational User)
4,4'-DDT	Liver	8.5	ILCR = 10^{-6} (Recreational User)
Total PCBs	Immune System/Skin	5.3	HQ = 1 (Recreational User)
Arsenic	Skin	30	ILCR = 10^{-5} (Recreational User)
Chromium (VI)	GI System	14	ILCR = 10^{-5} (Recreational User)
Thallium	Skin	3.5	HQ = 1 (Recreational User)

Key

NA - Not applicable

SSL - Soil Screening Level.

DAF - Dilution Attenuation Factor.

MCL - Maximum Contaminant Level.

1. See Attachment 2 of the 2017 FS Report Addendum for cleanup level development and basis:
   ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000 and 10^{-5} = 1 in 100,000
   HQ - Hazard Quotient
   Leachability - MCL-based SSLs provided on the November 2016 Regional Screening Level table (ILCR = 10^{-6}; HQ = 1), multiplied by 10 for a DAF = 10. If no MCL-based SSL was available on the RSL table, the risk-based SSL was used after being multiplied by 10 for DAF = 10.
2. Cleanup levels based on leachability are applicable to soils above the water table only. Risk-based cleanup levels are applicable to soils to a depth of 15 feet. Leachability values are applicable to all three properties; risk-based cleanup values are applicable to the Whitney Property, except for thallium which is only applicable to the Murphy Property.

<u>Cancer Classification</u>

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-3: Wetland Sediment/Soil Cleanup Levels for the Protection of Human Health (Murphy Wetland)

Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Level[1] mg/kg	Basis[1]
Total PCBs	B2	8.4	HQ = 1 (Recreational User)

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Level[1] mg/kg	Basis[1]
C11-C22 Aromatics	Blood	14,000	HQ = 1 (Recreational User)
Total PCBs	Immune System/Skin	8.4	HQ = 1 (Recreational User)
Lead	Nervous System	570	IEUBK Model

Key

NA - Not applicable

1. See Attachment 2 of the 2017 FS Report Addendum for cleanup level development and basis:

    HQ - Hazard Quotient

<u>Cancer Classification</u>

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-4: Wetland Sediment/Soil Cleanup Levels for the Protection of Ecological Receptors (Murphy Wetland)

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis	Assessment Endpoint
PROPOSED CLEANUP LEVEL						
Seasonally Ponded Area	Wetland Sediment	Total PCBs (Aroclors)	1.9	mg/kg	Shrew Site-Specific MATC [1]	All Receptor Endpoints
		Chromium	130	mg/kg	Mean Background Concentration	
		Lead	330	mg/kg	Mean Background Concentration	
		Zinc	460	mg/kg	Benthic PEC	
Forested/Shrub Area	Wetland Soil	Total PCBs (Aroclors)	1.3	mg/kg	Shrew Site-Specific MATC [1]	Survival and reproduction of insectivorous mammal population
		Chromium	1900	mg/kg	Shrew Site-Specific MATC [1]	

Notes:

[1] The site-specific MATC (set as the geometric mean between the NOAEL and LOAEL values) has been selected as the protective level for each COC for the muskrat and shrew.

COC - Chemical of Concern

PEC - Probable Effect Concentration

NOAEL - No observed adverse effect level.

LOAEL - Lowest observed adverse effect level.

MATC - Maximum Acceptable Toxic Concentration .

Table L-5. Cost Summary for EPA's Selected Remedy

Alternative	**Capital Cost** (construction) (millions)	**Contigency** (millions)	**O&M** (millions)	**Total Cost** (construction, contigenc and O&M) (millions)
SW-3/SM-3/SA-3 - Soil Excavation, Off-Site Disposal, Capping and Institutional Controls	$7.5	$2.1	$0.76	$10.4
GW-6 - Pump and Treat and Institutional Controls	$1.8	$0.58	$1.8	$4.2
N-3 - Excavation and Off-Site Disposal [1]	$1.8	$0.44	$0.13	$2.3
WTL-5 - Deep Excavation and Off-Site Disposal, Backfill, and Wetland Restoration	$1.5	$0.38	$0.28	$2.2
			Overall Cost for Preferred Options	$19.1

Notes

[1] Cost for Alterative N-3 has been adjusted downward because Alternative SW-3 includes excavation within the area where NAPL is present on the Whitney Property.

Appendix C: Figures

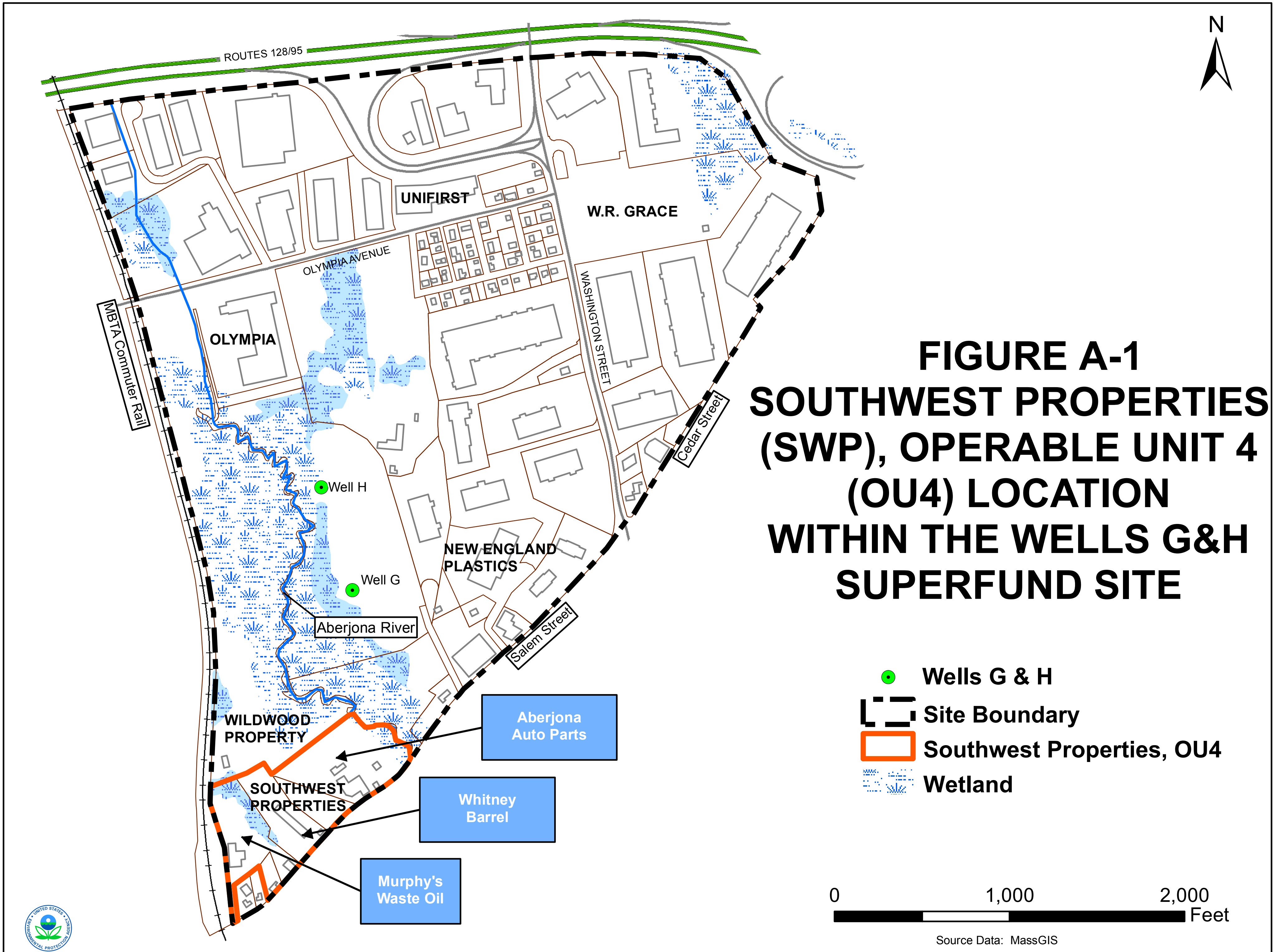
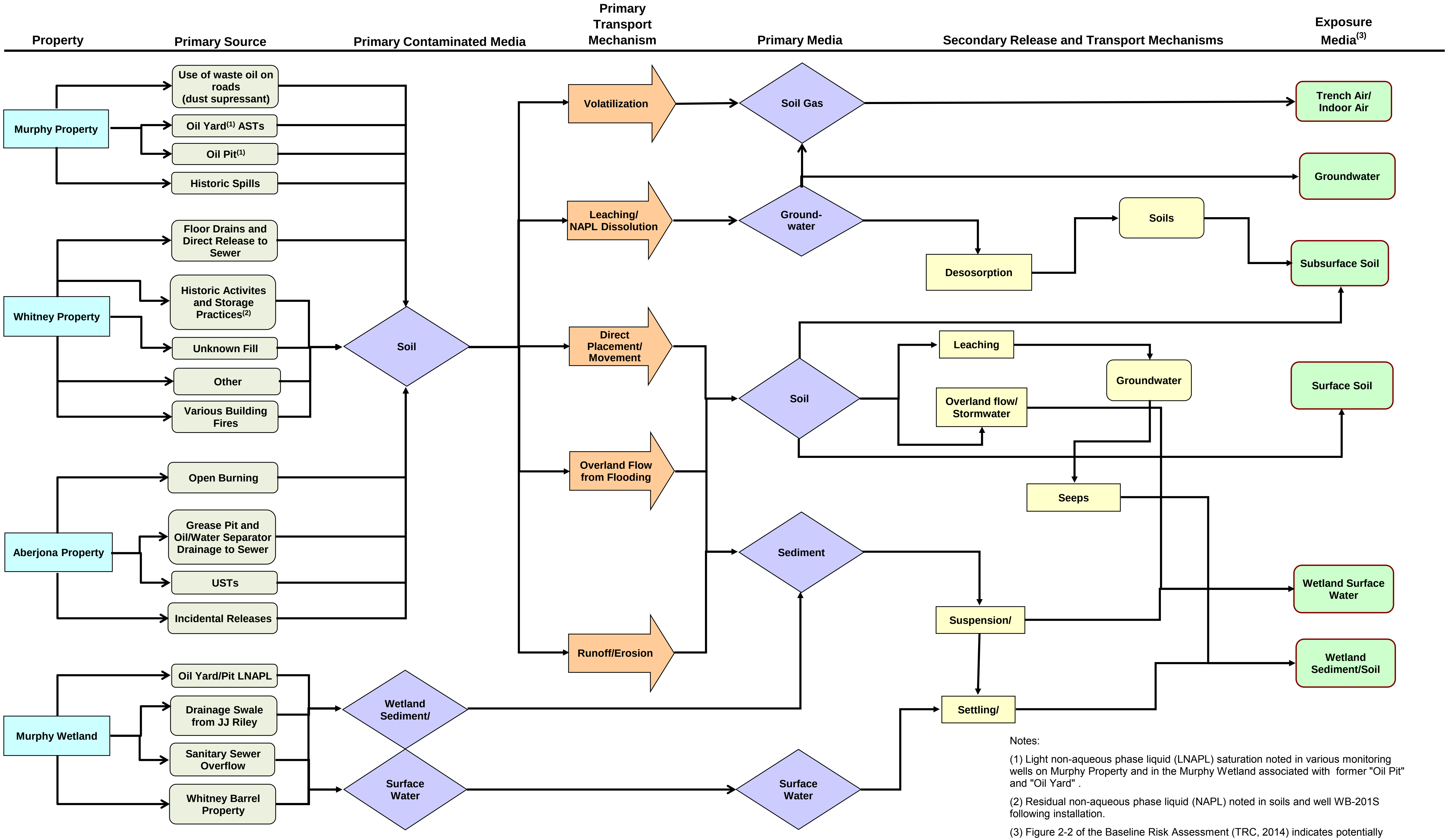


FIGURE A-1 SOUTHWEST PROPERTIES (SWP), OPERABLE UNIT 4 (OU4) LOCATION WITHIN THE WELLS G&H SUPERFUND SITE

R:\Projects\GIS_2017\170830- AECOM SW prop\mxd\Figure 6.mxd

Figure E-1
Conceptual Site Model
Southwest Properties
Remedial Investigation

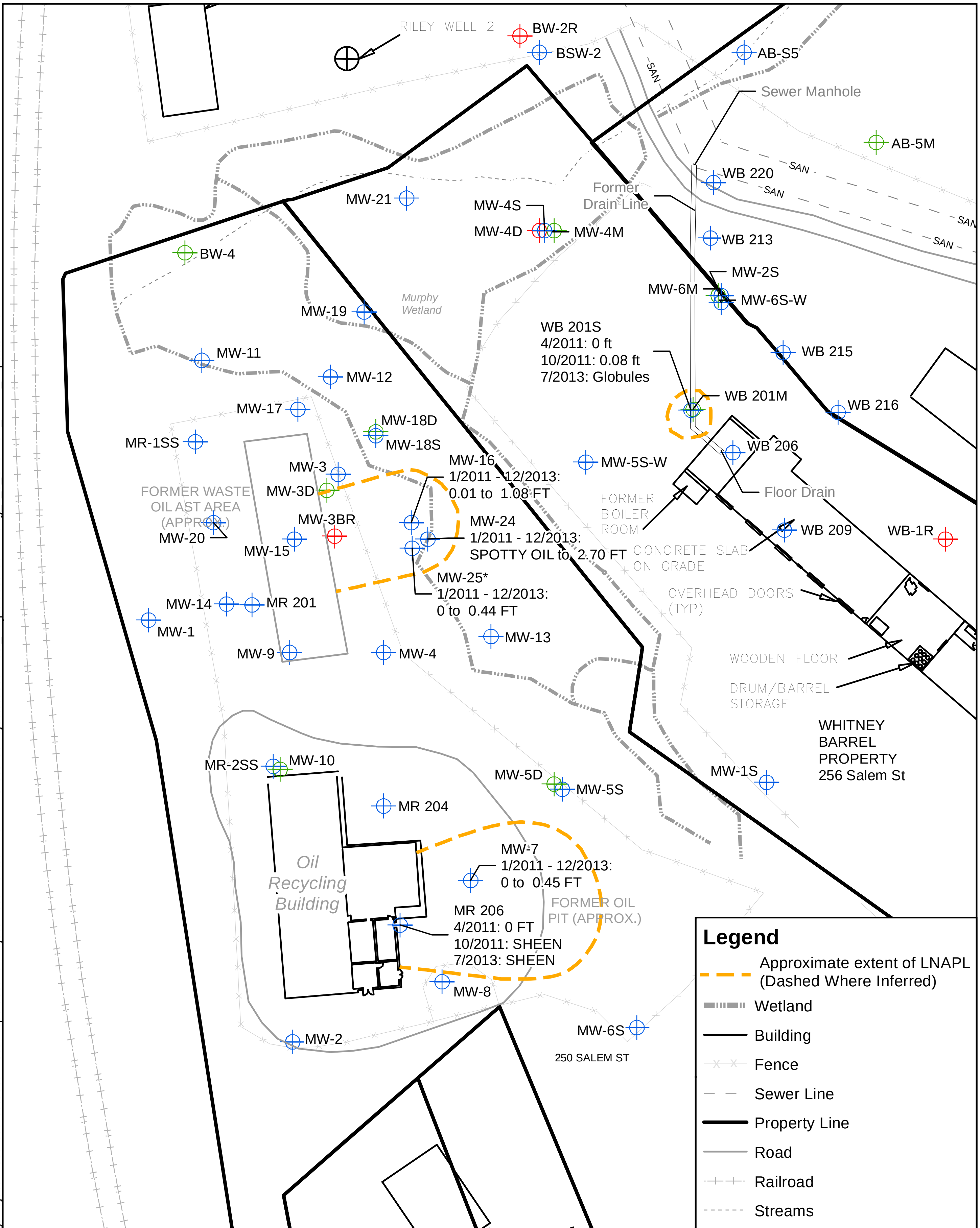


Notes:

(1) Light non-aqueous phase liquid (LNAPL) saturation noted in various monitoring wells on Murphy Property and in the Murphy Wetland associated with former "Oil Pit" and "Oil Yard" .

(2) Residual non-aqueous phase liquid (NAPL) noted in soils and well WB-201S following installation.

(3) Figure 2-2 of the Baseline Risk Assessment (TRC, 2014) indicates potentially complete exposure pathways and receptors for the exposure media presented here.



Path: P:\Jobs\Rem_Eng\Project Files\Beatrice\Southwest Properties\7.0 Project Documents\7.2 CADD-GIS\GIS\Projects\Southwest_Properties\FS\MXD\Fig_1_8_Overview_NAPL_Impacts.mxd

AECOM

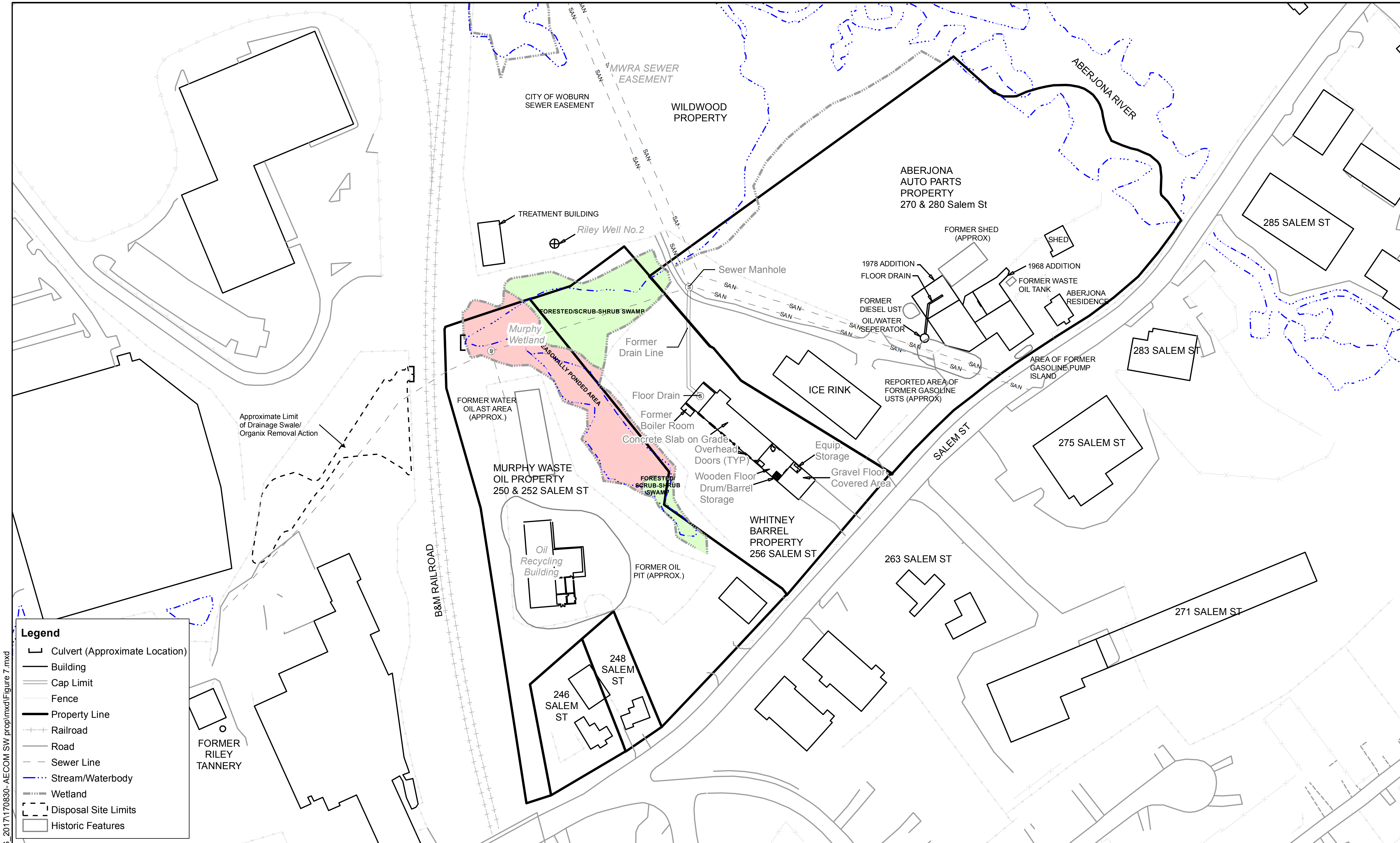
Intermediate/Deep Overbuden Well
Shallow Overburden Well
Bedrock Groundwater Well

0 40 80 Feet

N W E S

Data as reported for 2011-2013 RI activities, and in the Immediate Response Action Status Report, dated February 6, 2015 (Clean Harbors, 2015

FIGURE E-2
OVERVIEW OF
NAPL IMPACTS



Wetland Area (Murphy Wetland)

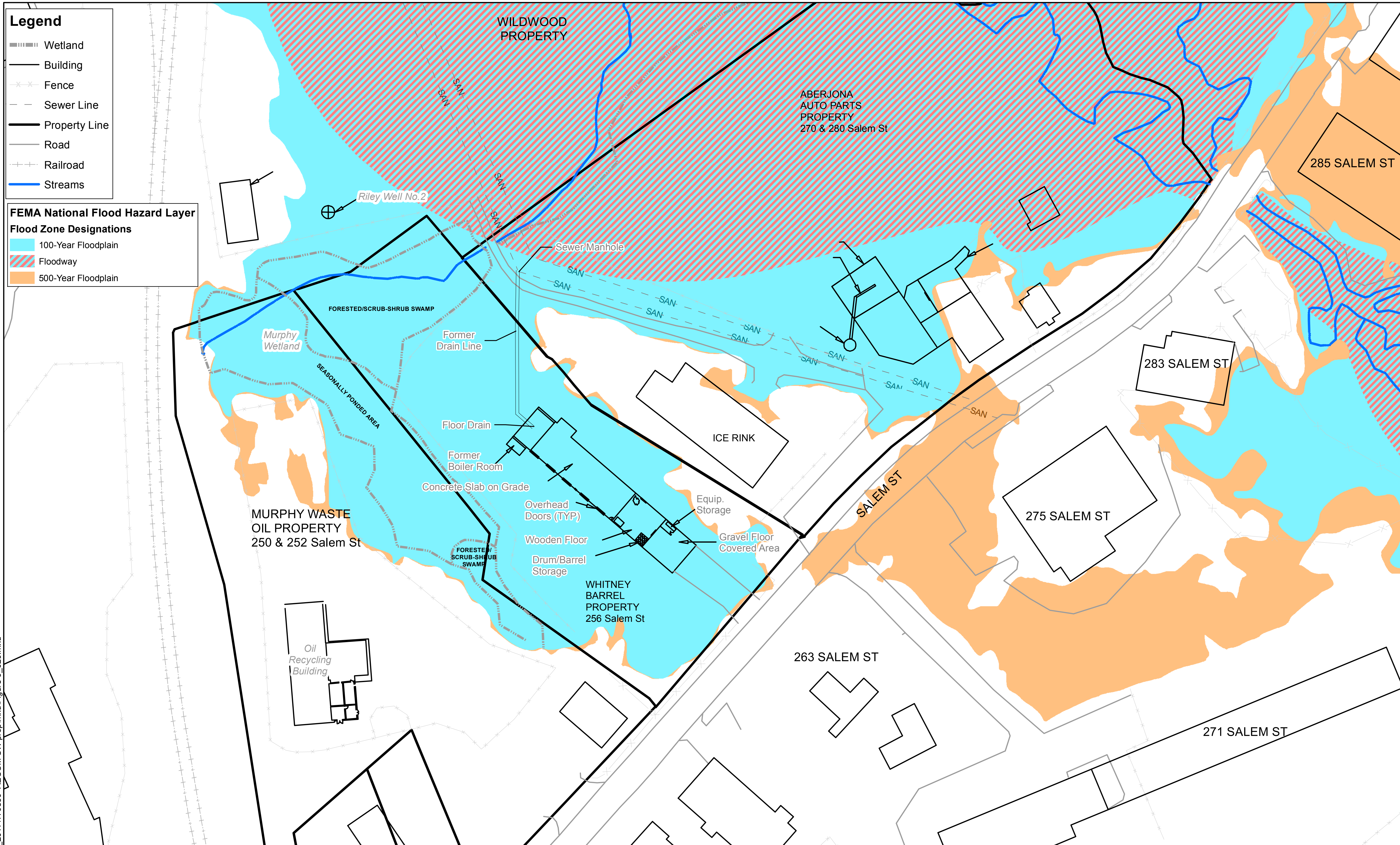
Forested Scrub Shrub

Seasonally Ponded Area

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

FIGURE E-3
SWP LAYOUT

DATE: 7/5/2017 | DRWN: | PROJECT 60312288



Path: R:\Projects\GIS_2017\170830- AECOM SW prop\mxd\Figure 6_629.mxd

Note: Data from Flood Insurance Rate Maps (FIRM) Panel 25017C0407E, published by the Federal Emergency Management Agency. Map Effective Date: June 3, 2010.
Shapefle Data Souce: MassGIS

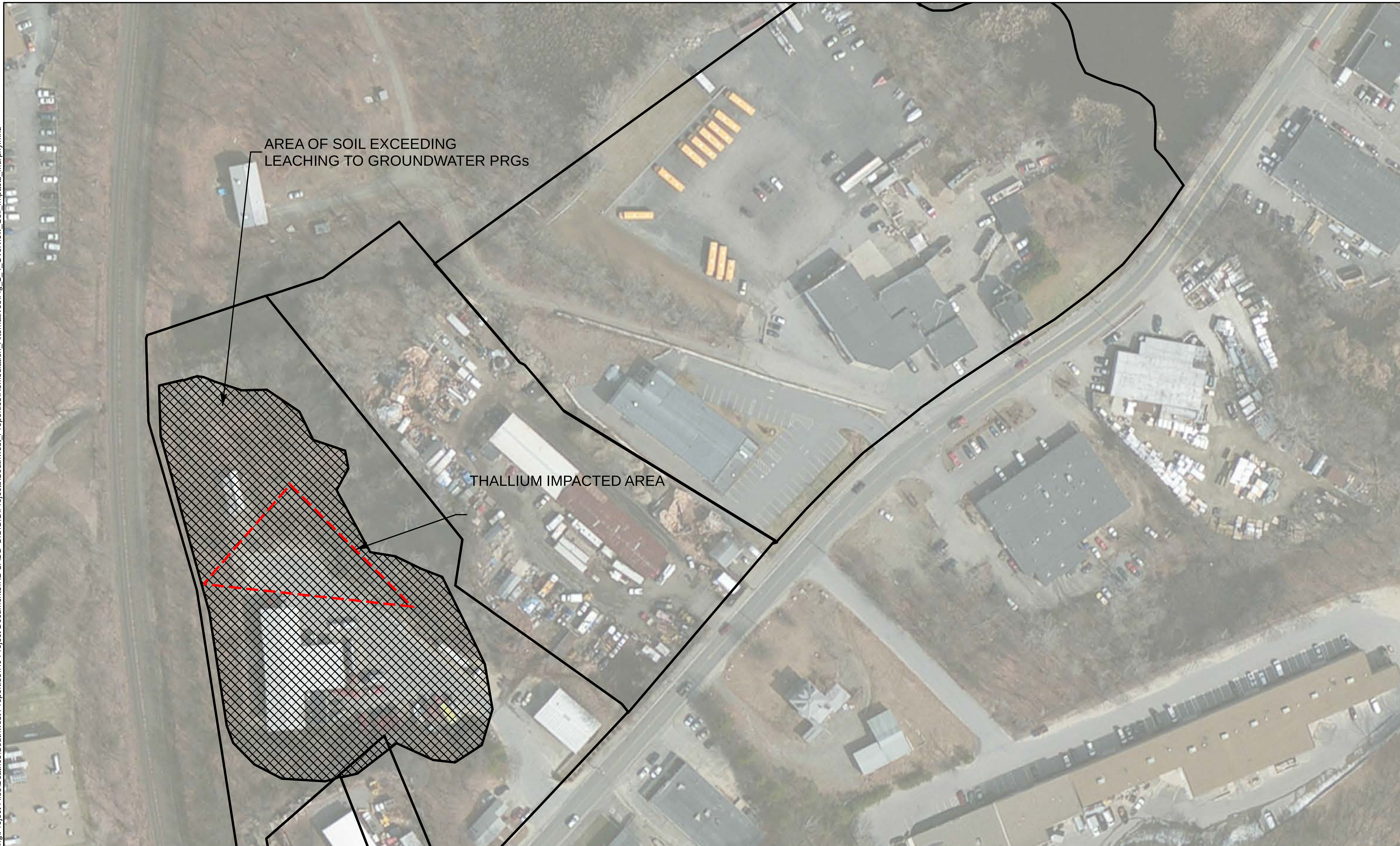
N W E S

0 50 100 Feet

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 6/30/2017	DRWN:	PROJECT 60312288

FIGURE E-4
FEMA FLOOD HAZARD



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AECOM

Legend

Property Line

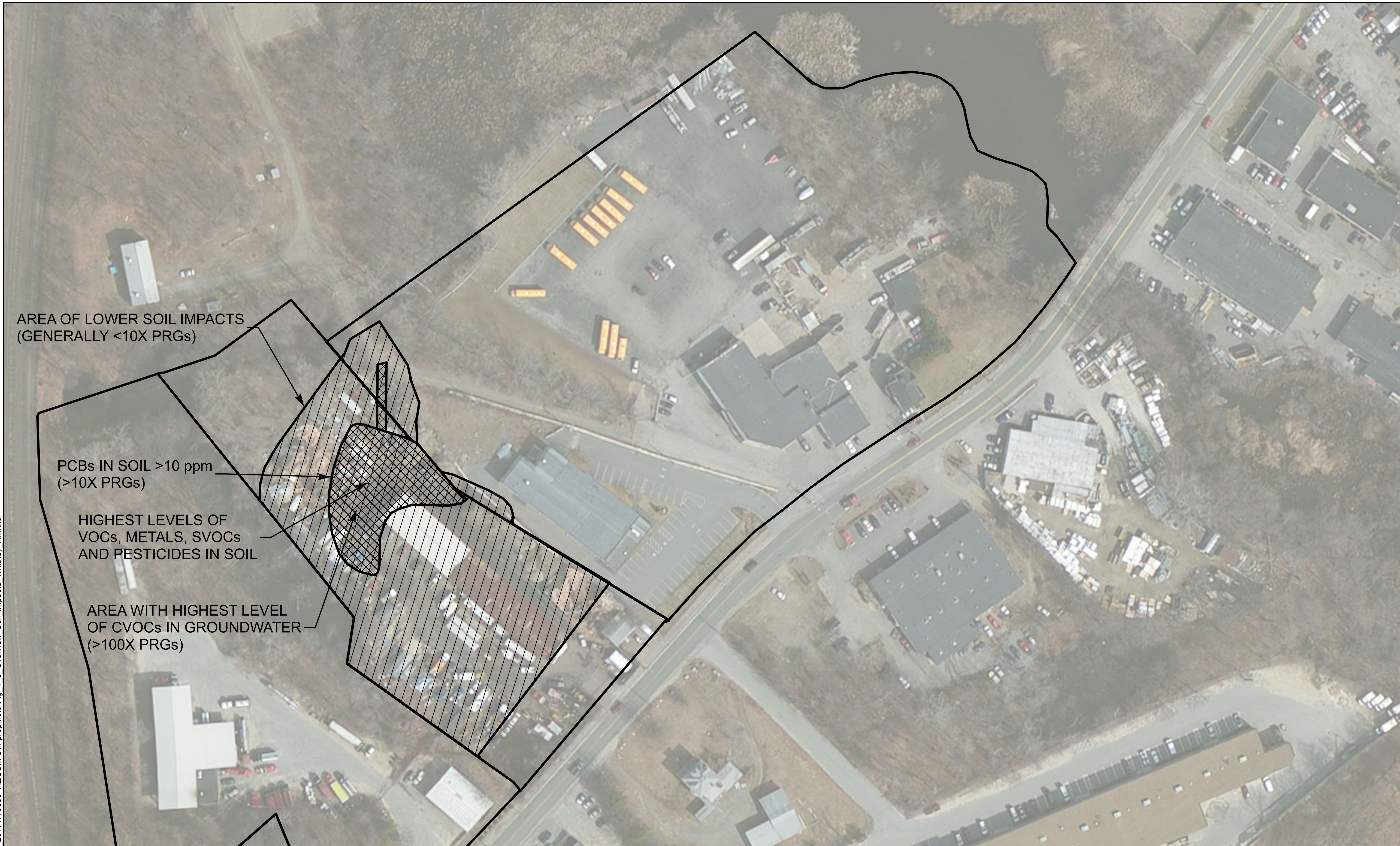
0 50 100 Feet

N W E S

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 8/16/2017 | DRWN: | PROJECT 60312288

FIGURE E-5
OVERVIEW OF SOIL
IMPACTS AT MURPHY



Path: R:\Projects\GIS_2017\170830-AECOM SW prop\mxd\Fig_1_5_Overview_Soil_Impacts_Whitney_RI.mxd

AECOM

Legend

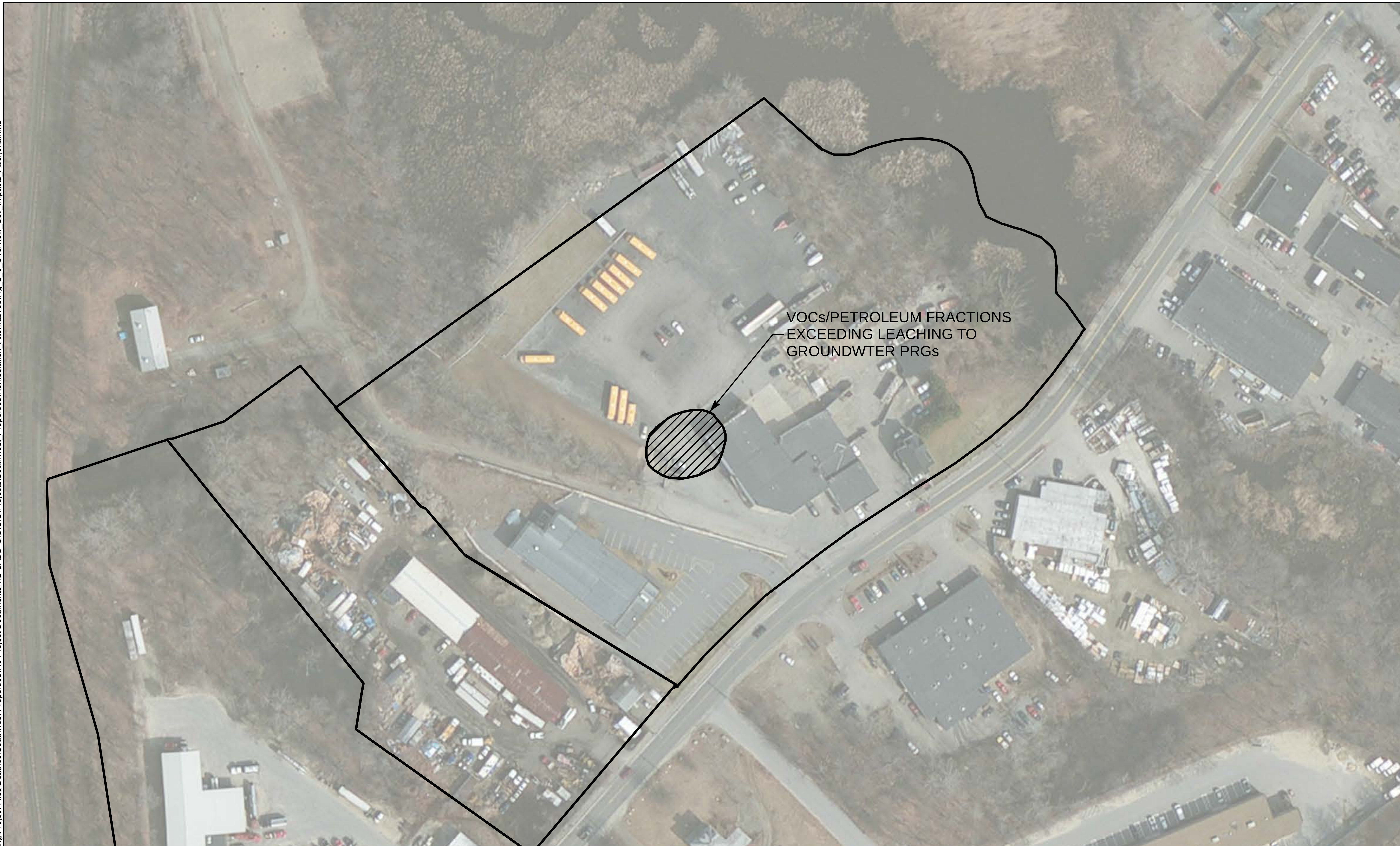
Property Line

0 50 100 Feet

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 7/10/2017 | DRWN: | PROJECT 60312288

FIGURE E-6
OVERVIEW OF SOIL IMPACTS
AT WHITNEY



Path: P:\Jobs\Rem_Eng\Project Files\Beatrice\Southwest Properties\7.0 Project Documents\7.2 CADD-GIS\GIS\Projects\Southwest_Properties\Remediation_Alternatives\Fig_1_6_Overview_Soil_Impacts_Aberjona.mxd

AECOM

Legend

Cap Area — Property Line

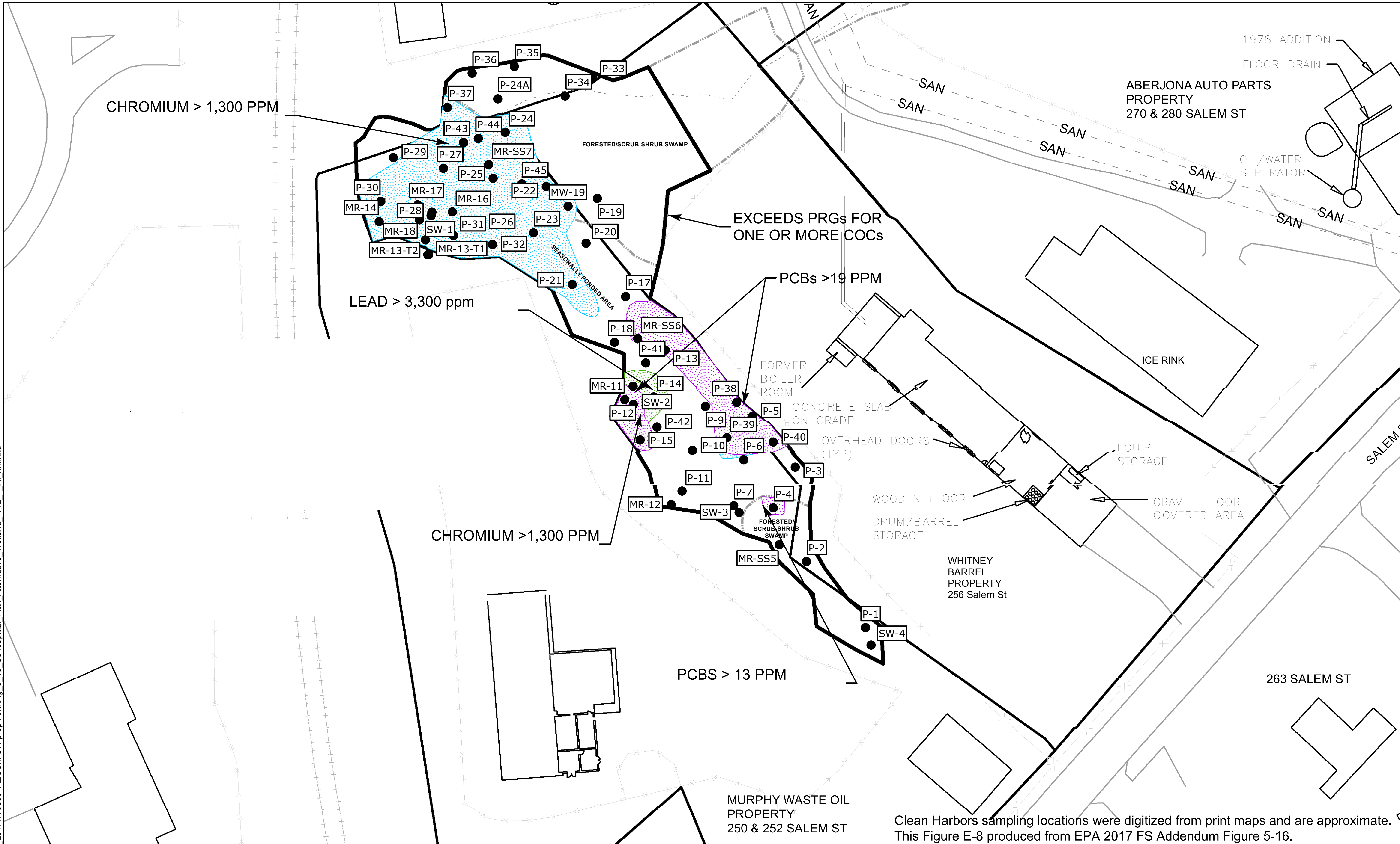
N E S W

0 50 100 Feet

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 12/5/2016 | DRWN: | PROJECT 60312288

FIGURE E-7
OVERVIEW OF SOIL IMPACTS
AT ABERJONA



Path: R:\Projects\GIS_2017\170830-AECOM SW prop\mxd\Fig_5_16_Conceptual_Plan_Alternative_Wetland_WTL_4_RI_hh.mxd

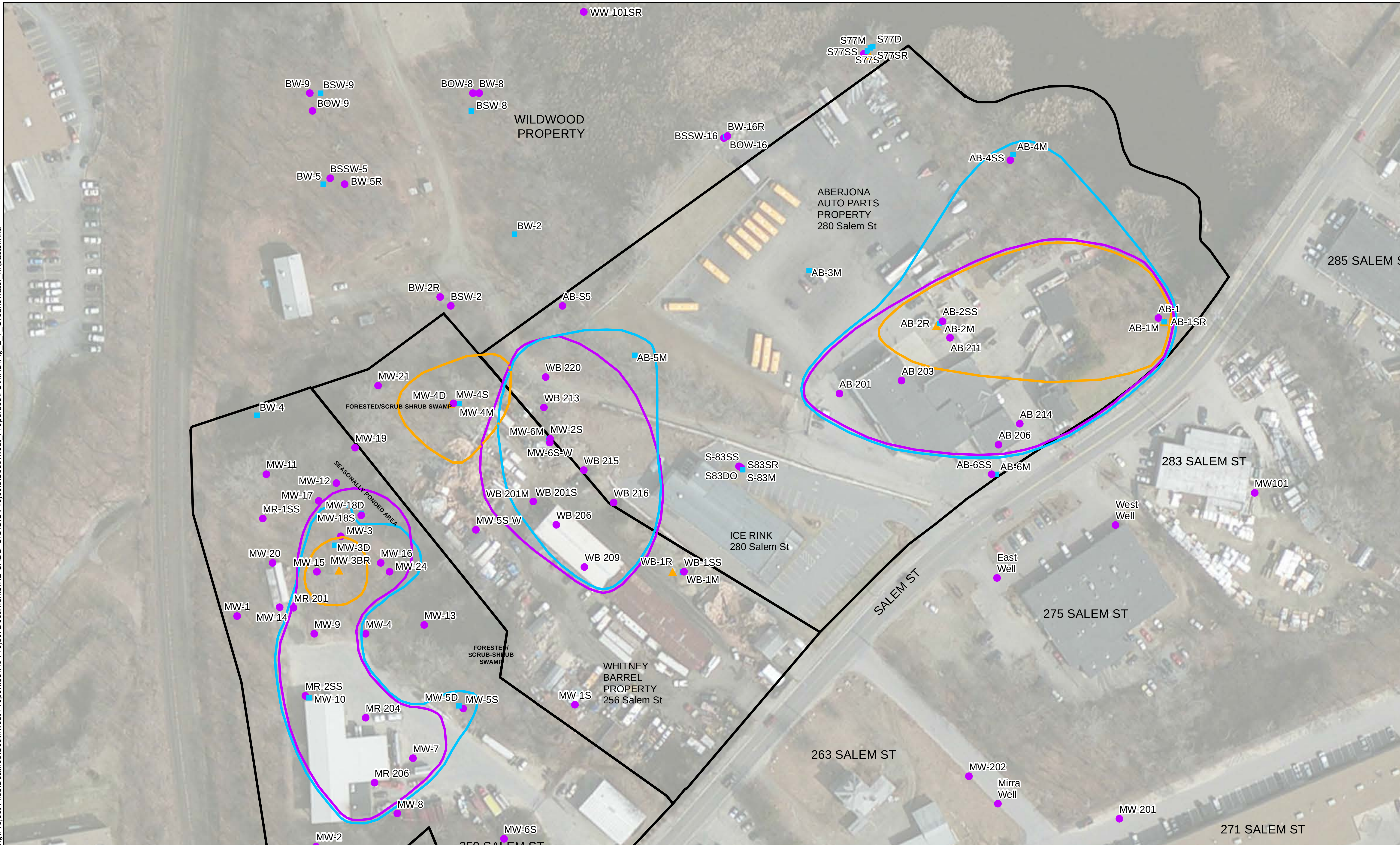
Legend

- PCBs EXCEEDANCES 10X PRG
- CHROMIUM EXCEEDANCES 10X PRG
- LEAD EXCEEDANCES 10X PRG
- WETLAND SAMPLE LOCATIONS EXCEEDING PRGS

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 7/5/2017 | DRWN: | PROJECT 60312288

FIGURE E-8
OVERVIEW OF WETLAND
SEDIMENT/SOIL IMPACTS



Path: P:\Jobs\Rem_Eng\Project Files\Beatrice\Southwest Properties\7.0 Project Documents\7.2 CADD-GIS\GIS\Projects\Southwest_Properties\FS\MXD\Fig_1_7_Groundwater_Impacts.mxd

AECOM

- Bedrock Well
- Intermediate/Deep Well
- Shallow Well

- Bedrock Exceedances (Dashed Where Inferred)
- Intermediate Exceedances
- Shallow Exceedances

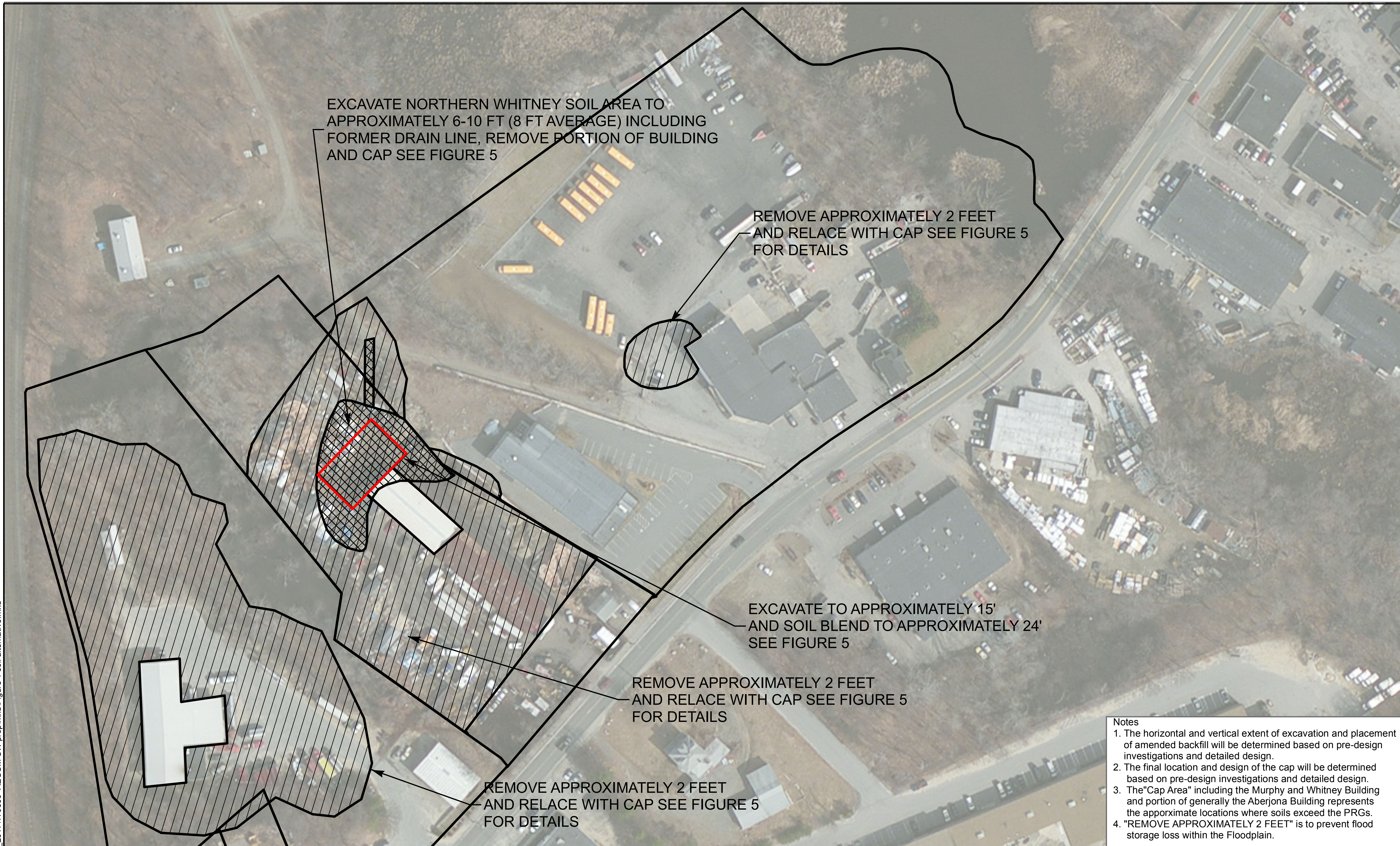
N E S W

0 50 100 Feet

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 12/7/2016	DRWN: J.E.B.	PROJECT 60312288

FIGURE E-9
OVERVIEW OF SWP-WIDE GROUNDWATER IMPACTS



Notes
1. The horizontal and vertical extent of excavation and placement of amended backfill will be determined based on pre-design investigations and detailed design.
2. The final location and design of the cap will be determined based on pre-design investigations and detailed design.
3. The"Cap Area" including the Murphy and Whitney Building and portion of generally the Aberjona Building represents the apporximate locations where soils exceed the PRGs.
4. "REMOVE APPROXIMATELY 2 FEET" is to prevent flood storage loss within the Floodplain.

Legend

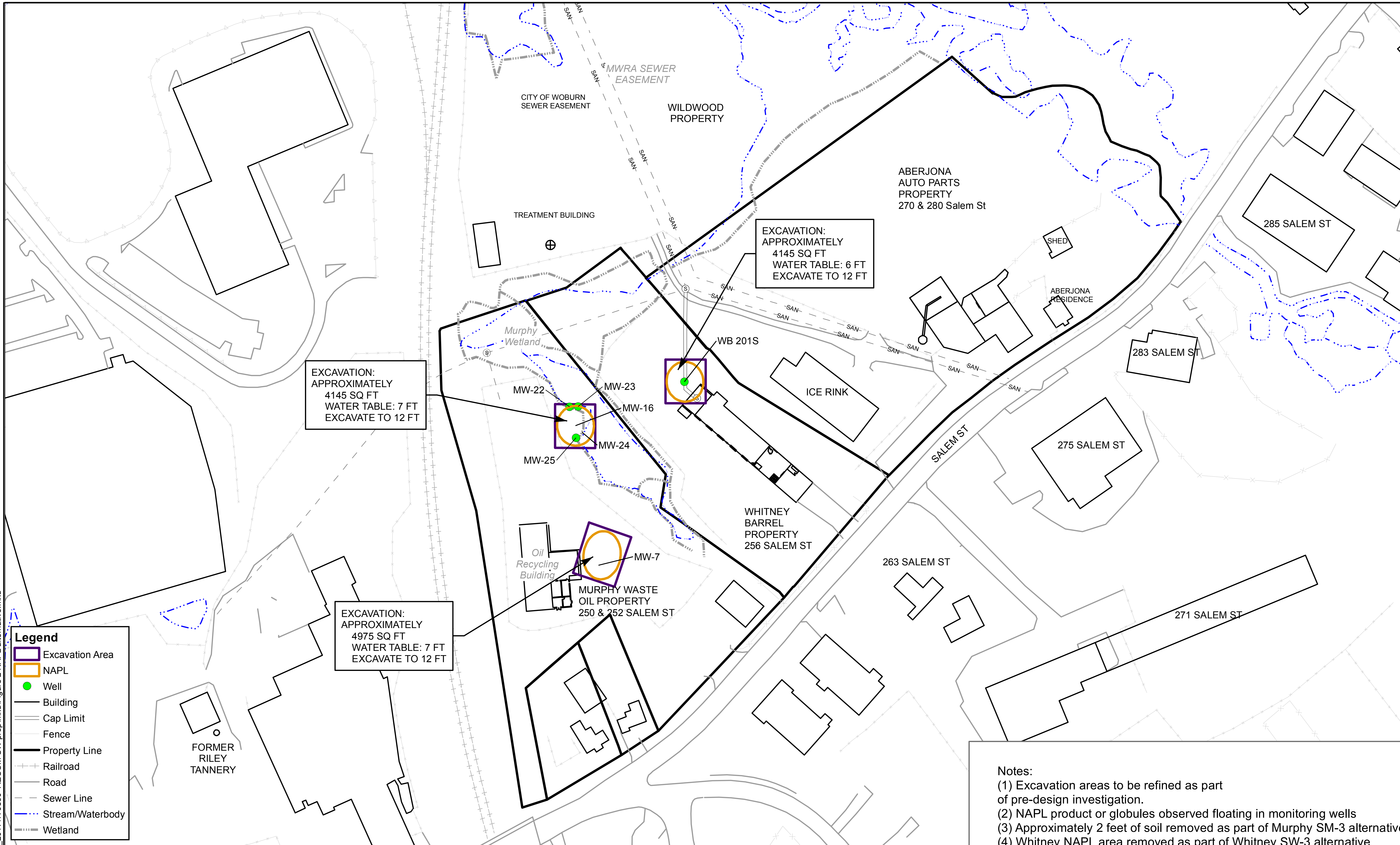
Cap Area
Excavation
Deeper Excavation
Property Line

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 6/30/2017 | DRWN: | PROJECT 60312288

FIGURE L-1
CONCEPTUAL PLAN FOR SOIL
SM-3, SW-3 & SA-3 ALTERNATIVES

Path: R:\Projects\GIS_2017\170830-AECOM SW prop\mxd\Figure 1 soil alternative.mxd



Notes:
(1) Excavation areas to be refined as part of pre-design investigation.
(2) NAPL product or globules observed floating in monitoring wells
(3) Approximately 2 feet of soil removed as part of Murphy SM-3 alternative
(4) Whitney NAPL area removed as part of Whitney SW-3 alternative

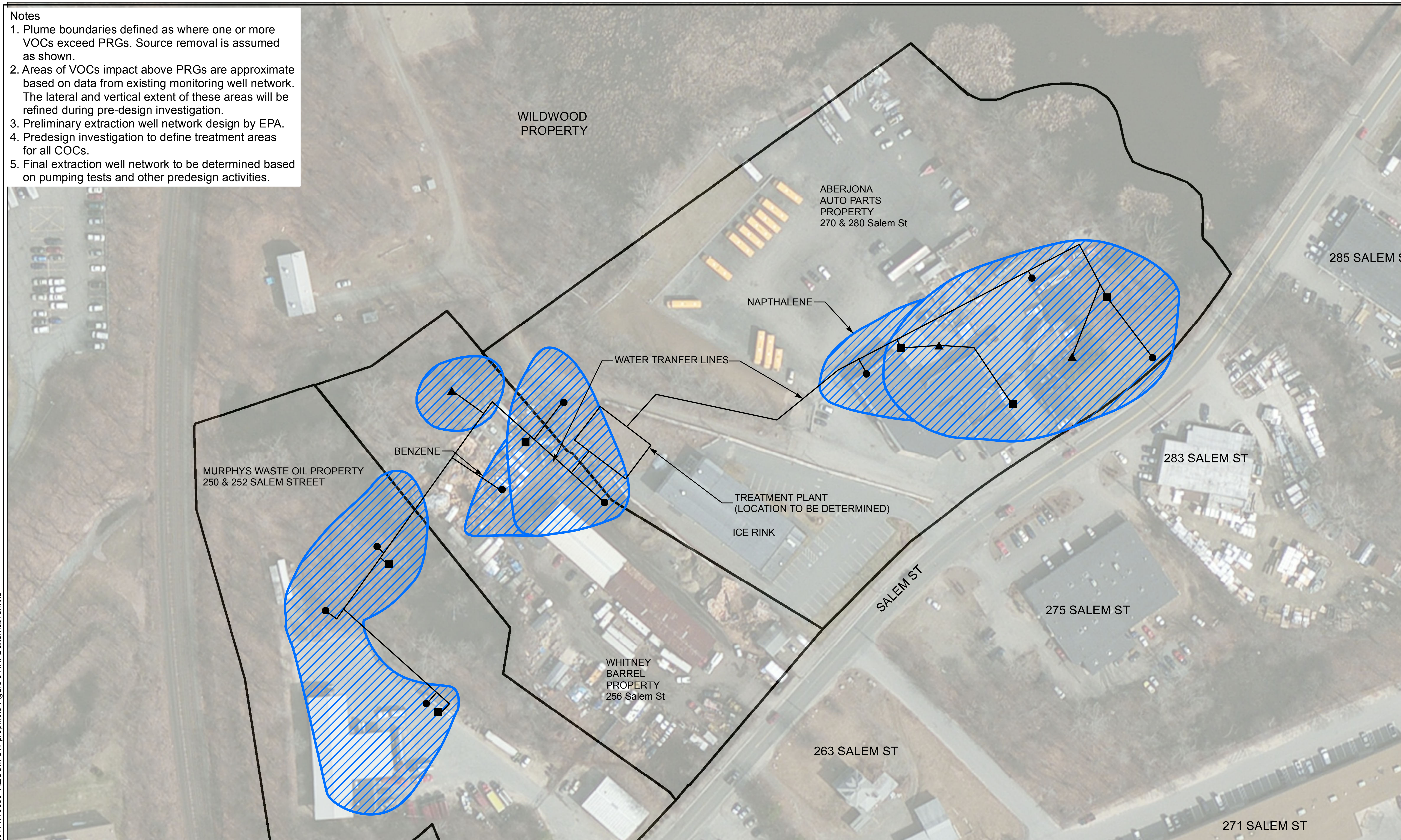
Path: R:\Projects\GIS_2017\170830-AECOM SW prop\mxd\Figure 2 NAPL alternative.mxd

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 6/30/2017 | DRWN: | PROJECT 60312288

FIGURE L-2
CONCEPTUAL PLAN FOR NAPL
ALTERNATIVE N-3

Notes
1. Plume boundaries defined as where one or more VOCs exceed PRGs. Source removal is assumed as shown.
2. Areas of VOCs impact above PRGs are approximate based on data from existing monitoring well network. The lateral and vertical extent of these areas will be refined during pre-design investigation.
3. Preliminary extraction well network design by EPA.
4. Predesign investigation to define treatment areas for all COCs.
5. Final extraction well network to be determined based on pumping tests and other predesign activities.



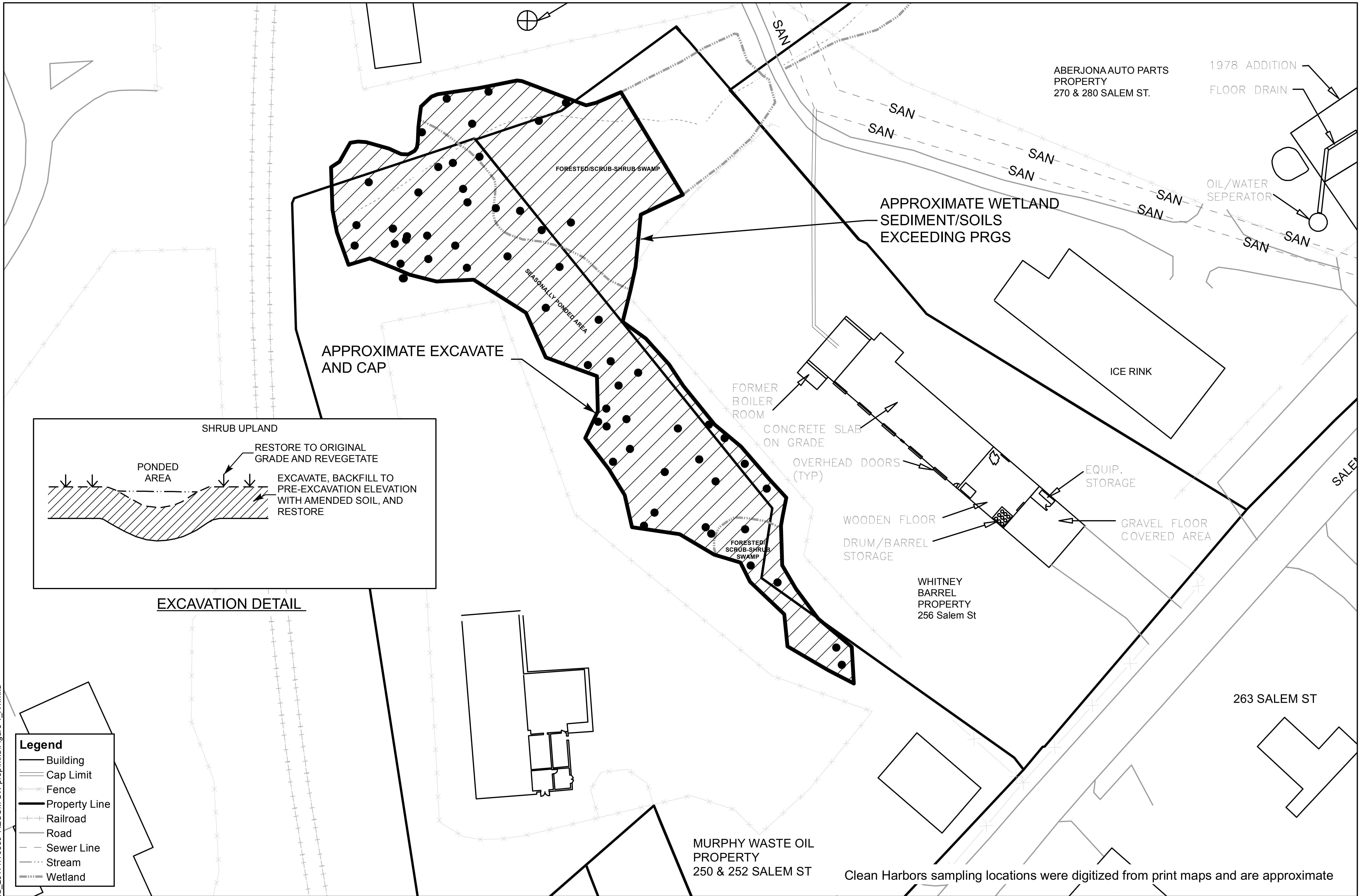
Proposed Extraction Wells
- ● Shallow
- ■ Intermediate
- ▲ Bedrock

Approximate location where groundwater exceeds Volatile Organic Compounds (VOCs) PRGs

0 50 100 Feet

WELLS G & H SOUTHWEST PROPERTIES WOBURN, MA	FIGURE L-3 CONCEPTUAL PLAN FOR GROUNDWATER ALTERNATIVE GW-6
DATE: 6/30/2017 DRWN: J.E.B. PROJECT 60312288	

Path: R:\Projects\GIS_2017\170830- AECOM SW prop\mxd\Figure 3 NAPL alternative.mxd



Path: R:\Projects\GIS_2017\170830- AECOM SW prop\mxd\Figure 4_R1.mxd

Legend

Approximate Excavate and Restore Area

Wetland Sample Location Exeeding PRGs

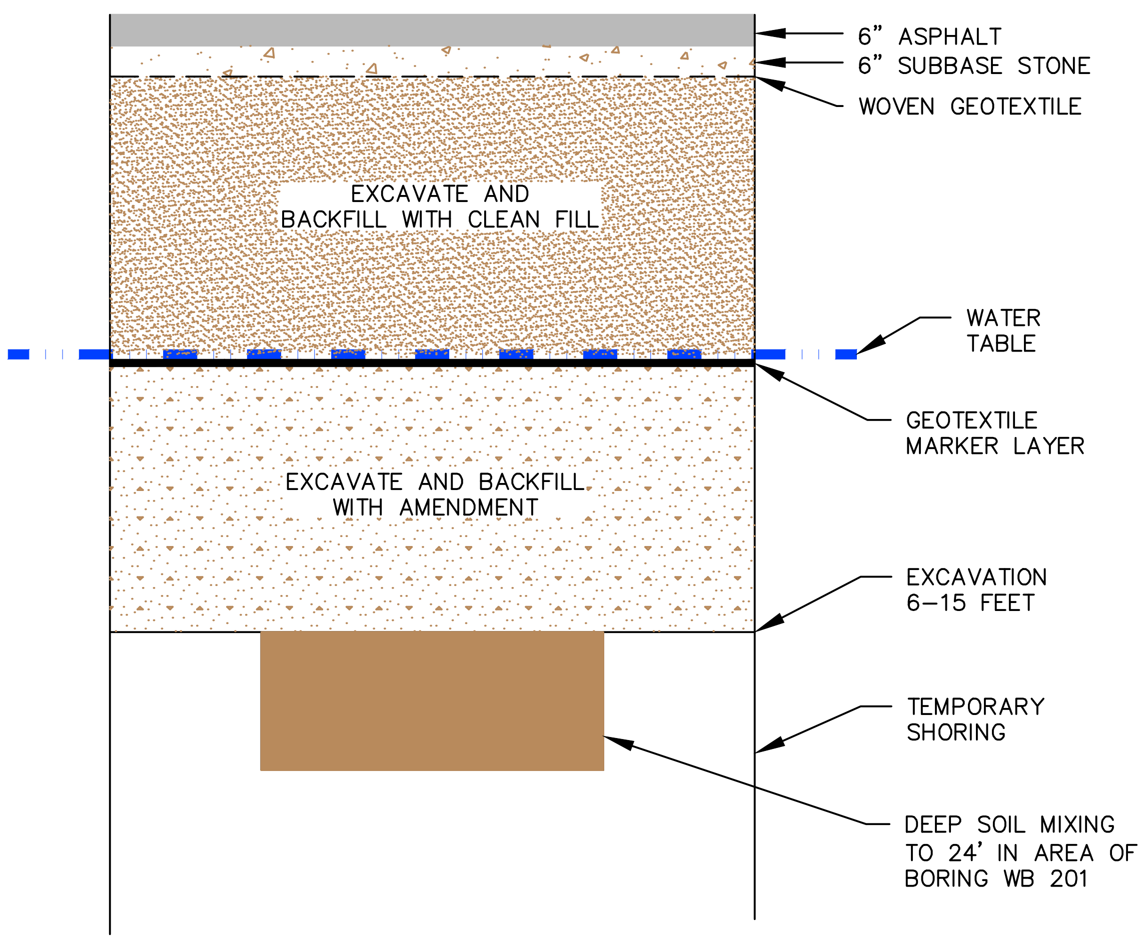
Note:
1) Preliminary Remediation Goals

0 25 50 Feet

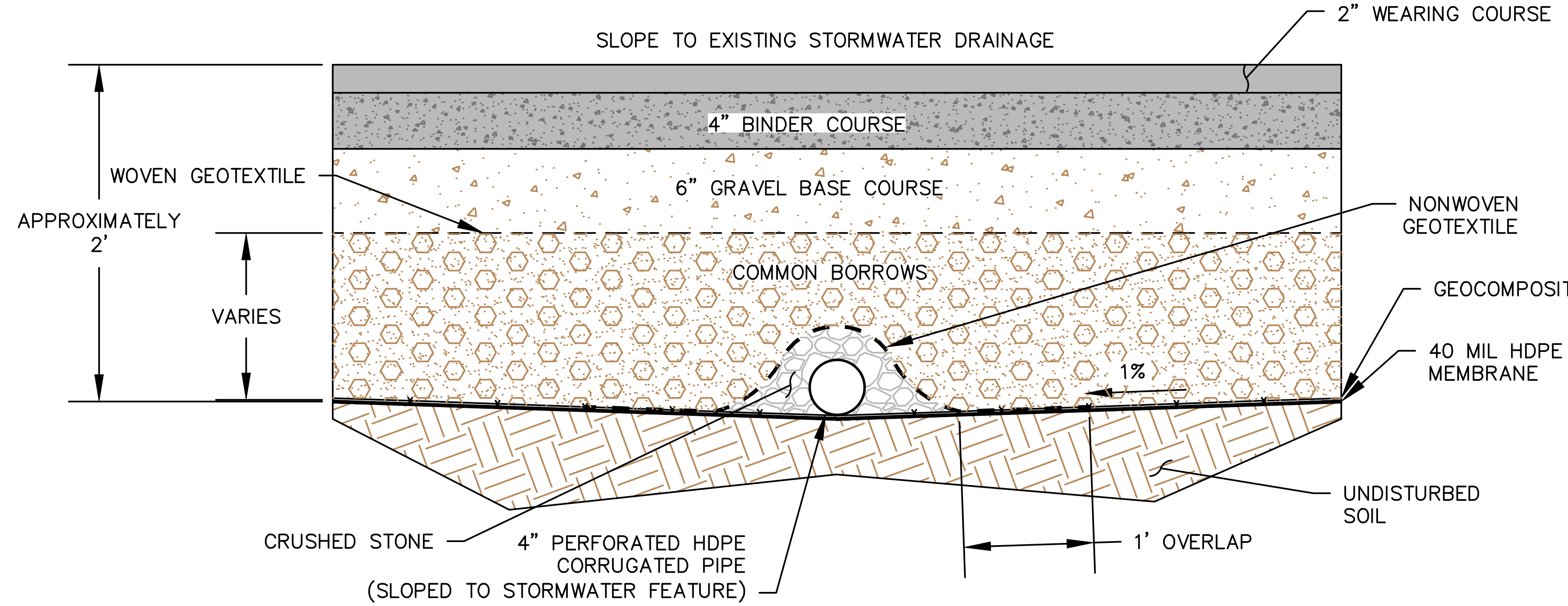
WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

FIGURE L-4
CONCEPTUAL PLAN FOR WETLAND
ALTERNATIVE WTL-5

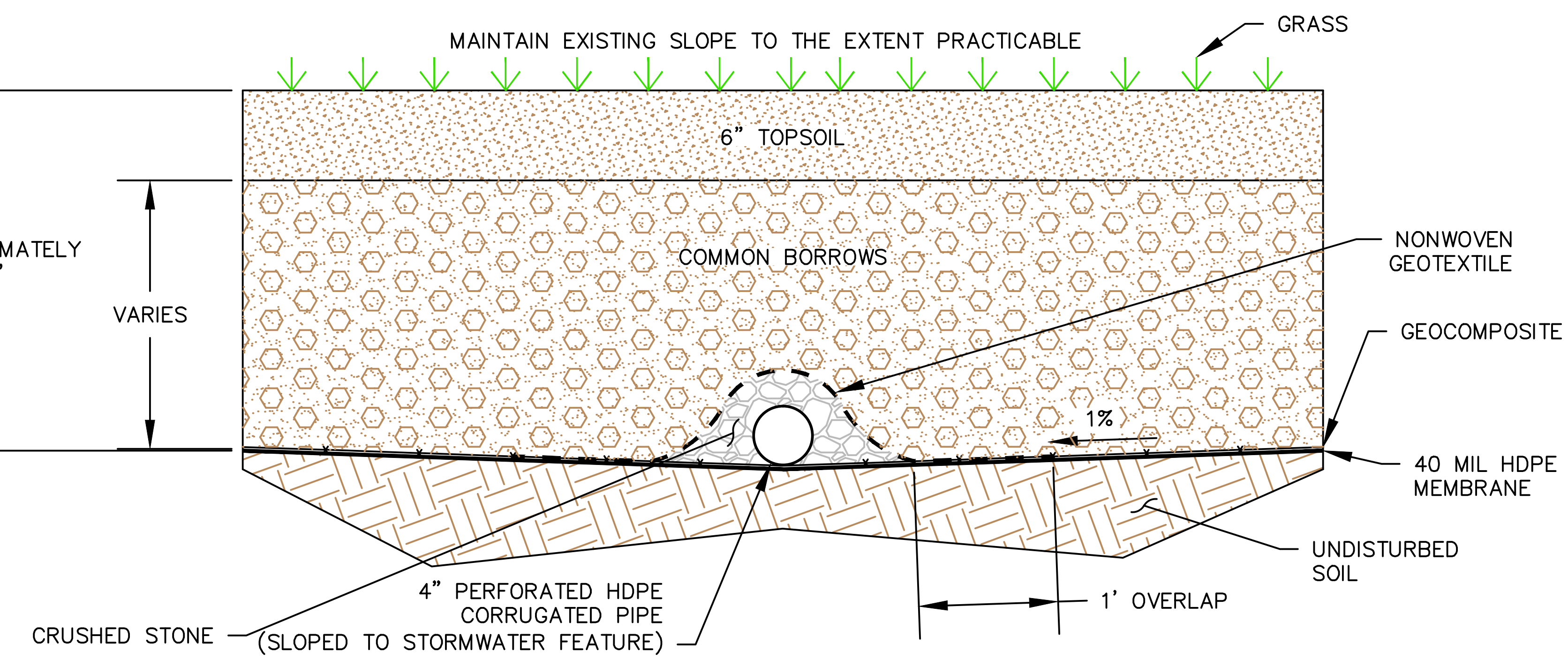
DATE: 6/30/2017	DRWN:	PROJECT 60312288



DETAIL A



EXCAVATE 2' AND MEMBRANE CAP
WITH ASPHALT SURFACE



EXCAVATE 2' AND MEMBRANE CAP
WITH GRASS SURFACE

DETAIL B

WELLS G & H
SOUTHWEST PROPERTIES
WOBURN, MA

DATE: 6/29/2017 | DRWN: JB

FIGURE L-5
CONCEPTUAL FILL/CAP DESIGNS

Appendix D: ARARs Tables

Table D-1

Chemical-Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Guidelines for Carcinogenic Risk Assessment	EPA/630/P-03/001F	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Partial excavation and off-site disposal, capping, and institutional controls (ICs) would prevent exposure to soil contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F	To Be Considered	This provides guidance on assessing risk to children from carcinogens.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to soil contaminants which contribute to a calculated carcinogenic risk to children, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
EPA Risk Reference Doses (RfDs)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to soil contaminants which contribute to a calculated non-carcinogenic risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
Human Health Assessment Cancer Slope Factors (CSFs)		To Be Considered	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to soil contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
EPA Carcinogenic Assessment Group Potency Factors		To Be Considered	These factors are used to evaluate an acceptable risk from a carcinogen.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to soil contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.

Table D-1

Chemical-Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Updated Scientific Considerations for Lead in Soil Cleanups	EPA OLEM Directive 9200.2-167	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil. Used to develop site-specific risk-based standards. Recommends evaluating potential risks from exposures to lead at a Superfund site at a target blood lead level lower than 10 µg/dL.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to lead-contaminated soil which contributes to a calculated risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil	EPA-540-R-03-001 (January 2003)	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to lead-contaminated soil which contributes to a calculated risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
Guidance on Remedial Actions for Superfund Sites with Polychlorinated Biphenyl (PCB) Contamination	EPA-540-G-90-007 (August 1990)	To Be Considered	EPA Guidance for evaluating risks posed by PCBs at Superfund sites. Used to develop risk-based cleanup standards.	Partial excavation and off-site disposal, capping, and ICs would prevent exposure to PCB soil contaminants which contribute to a calculated risk, developed using this guidance. Long-term monitoring and ICs will ensure the protectiveness of the caps and prevent residential development.
Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.	OSWER 9355.4-24 (2002)	To Be Considered	EPA Guidance for evaluating soil contamination. Used to develop soil contaminant leachability cleanup standards.	This alternative would prevent leaching of soil contaminants to groundwater through either removal/disposal or placing impermeable caps over all soil contamination left in place that poses a leachability risk to groundwater, based on standards developed using this guidance.
Soil Screening Guidance: Technical Background Document.	EPA/540/R 95/128 (1996)	To Be Considered	EPA Guidance for evaluating soil contamination. Used to develop soil contaminant leachability cleanup standards.	This alternative would prevent leaching of soil contaminants to groundwater through either removal/disposal or placing impermeable caps over all soil contamination left in place that poses a leachability risk to groundwater, based on standards developed using this guidance.

Table D-2

Location-Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Floodplain Management and Protection of Wetlands	44 C.F.R. 9	Relevant and Appropriate	Federal Emergency Management Agency (FEMA) regulations that set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands). Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Requires the avoidance of impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain and to avoid development within floodplain wherever there is a practicable alternative. An assessment of impacts to 500-year floodplain is required for critical actions – which includes siting waste facilities in a floodplain. Requires public notice when proposing any action in or affecting floodplain or wetlands.	If there is no practicable alternative method to work in federal jurisdictional wetlands, then all practicable measures will be taken to minimize and mitigate any adverse impacts. Erosion and sedimentation control measures will be adopted during excavation, soil management, and capping activities to protect federal jurisdictional wetlands. Standards for excavating/ managing contaminated soil and cap installation/O&M within the regulated 500-year floodplain will be attained. There will be no significant net loss of flood storage capacity and no significant net increase in flood stage or velocities. Floodplain habitat will be restored, to the extent practicable. Public comment was solicited as part of the Proposed Plan concerning the proposed alteration to wetlands and floodplain and no negative comments were received.
Resource Conservation and Recovery Act (RCRA) Floodplain Restrictions for Hazardous Waste Facilities	42 U.S.C. §§ 6901 *et seq.*; 40 C.F.R. § 264.18(b)	Applicable	A hazardous waste treatment, storage, or disposal facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or to result in no adverse effects on human health or the environment if washout were to occur.	Any hazardous waste generated from the excavation, excavation dewatering or capping activities or capped on-site will be managed so that it will not impact floodplain resources.
RCRA Floodplain Restrictions for Solid Waste Disposal Facilities and Practices	40 C.F.R. § 257.3-1	Applicable	Solid waste practices must not restrict the flow of a 100-year flood, reduce the temporary water storage capacity of the floodplain or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.	Any solid waste generated from excavation, excavation dewatering, or capping activities or capped on-site will be managed so that it will not impact floodplain resources.

Table D-2

Location-Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Clean Water Act §404, and regulations	33 U.S.C. 1344, 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323	Applicable	For discharge of dredged or fill material into water bodies or wetlands, there must be no practical alternative with less adverse impact on aquatic ecosystem; discharge cannot cause or contribute to violation of state water quality standard or toxic effluent standard or jeopardize threatened or endangered (T&E) species; discharge cannot significantly degrade waters of U.S.; must take practicable steps to minimize and mitigate adverse impacts; must evaluate impacts on flood level, flood velocity, and flood storage capacity. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources. EPA must determine which alternative is the "Least Environmentally Damaging Practicable Alternative" (LEDPA) to protect wetland and aquatic resources.	Under this alternative excavation/management of contaminated soil and capping activities may possibly impact federal jurisdictional wetlands. Activities effecting wetlands will be conducted in accordance with these requirements including, but not limited to, mitigation and/or restoration. EPA has determined these alternatives are the LEDPA because (a) there is no practical alternative method that will achieve cleanup objectives with less adverse impact and (b) all practical measures would be taken to minimize and mitigate any adverse impacts from the work. Public comment was solicited on EPA's LEDPA finding in the Proposed Plan and no negative comments were received.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 662, 663	Applicable	Requires consultation with appropriate agencies to protect fish and wildlife when federal actions may alter waterways. Must develop measures to prevent and mitigate potential loss to the maximum extent possible.	Consultation with appropriate federal agencies will be maintained during planning and implementation of these remedial alternatives that may alter protected resource areas.
U.S. Army Corps of Engineers, New England District Compensatory Mitigation Guidance (09-07-2016)		To Be Considered	This Guidance is to be considered when compensatory mitigation to address impacts to federal jurisdictional wetlands is appropriate for a particular remedial activity.	Under this alternative excavation/management of contaminated soil and capping activities may possibly impact federal jurisdictional wetlands. Activities effecting federal jurisdictional wetlands will be conducted in accordance with these guidance standards for mitigation and/or restoration.

Table D-2

Location-Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Standards				
Massachusetts Wetlands Protection Act and Regulations	MGL c. 131 § 40, 310 C.M.R. 10.00	Applicable	Regulations restrict dredging, filling, altering, or polluting inland wetland resource areas and impose performance standards for work in such areas (including 10.05(6)(k) (stormwater management). Protected resource areas include: 10.54 (Bank); 10.55 (Bordering Vegetated Wetlands); 10.56 (Land under Water); 10.57 (Bordering Land subject to Flooding); and 10.58 (Riverfront Area).	Under these alternatives soil excavation, management, and capping may possibly impact state regulated wetland resource areas and buffer zones. Any remedial action conducted within 100 feet of a state regulated wetland and 200 feet from a perennial stream will comply with these regulations. Mitigation of impacts on State wetland resource areas will be addressed.
Massachusetts Hazardous Waste Regulations, Location Standards for Land Subject to Flooding	310 C.M.R. 30.701	Applicable	Any new or expanding hazardous waste storage or treatment facility (which only receives hazardous waste from on-site sources), the active portion of which is located within the boundary of land subject to flooding from the statistical 100-year frequency storm, shall be flood-proofed. Flood-proofing shall be designed, constructed, operated and maintained to prevent floodwaters from coming into contact with hazardous waste.	Any hazardous waste generated from the excavation, excavation dewatering, or capping activities or capped will be managed so that it will not impact floodplain resources.
Massachusetts Clean Water Act; Water Quality Certification for Discharge of Dredged or Fill Material	M.G.L. ch.21, §§ 26-53; 314 C.M.R. §9.00	Applicable	Regulates discharges of dredged or fill material to protect aquatic ecosystems.	Under this alternative dredging/filling of wetlands during wetland soil/sediment excavation/ management and construction/O&M of the cap of the cap will be conducted so as to not impair surface water quality.

Table D-3

Action Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure	42 U.S.C. §6901 *et seq.*; 40 C.F.R. Parts 260-262 and 264	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State. Federal financial assurance requirements are defined at 40 C.F.R. 264.143.	Any wastes generated by soil excavation, excavation dewatering, capping, and monitoring activity will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste. Excavation and capping of hazardous wastes will need to meet closure/post closure standards, including financial assurance requirements.
Toxic Substances Control Act (TSCA); Polychlorinated Biphenyl (PCB) Remediation Waste	15 U.S.C. 2601 *et seq.;* 40 C.F.R. 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	The Record of Decision contains a finding by EPA (Appendix E) that the partial excavation, cap, monitoring and institutional controls (ICs) will prevent an unreasonable risk to human health or the environment as long as required protective conditions in the determination are met. All PCB contaminated soil exceeding recreational human health risk standards or ecological risk standards will be either excavated and disposed of off-site at a licensed facility or capped with a protective cover meeting risk-based standards. Any remaining PCB soil contamination exceeding residential risk standards will be subject to ICs that will prevent residential development. Monitoring and ICs will ensure long-term protectiveness of the cap and enforcement of restrictions on residential development. Any water generated from the remedial action that exceeds EPA risk standards will be treated to meet protective PCB discharge limits. Remedial measures will be based on *in-situ* PCB concentrations in soil.
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 C.F.R. Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any discharges from soil excavation/management, dewatering of excavations, or construction and operation and maintenance (O&M) of the caps will be treated to meet these standards before discharge to surface waters. Stormwater standards will be met if there is over one acre of construction.

Table D-3

Action Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Clean Water Act; Toxic Pollutant Effluent Standards	40 CFR 129	Applicable	Regulates surface water discharges of specific toxic pollutants, specifically certain pesticides and PCBs.	Any discharges from soil excavation/management, dewatering of excavations, or construction and O&M of the caps will be treated to meet applicable toxic pollutant discharge standards (if regulated contaminants are present) if the water is to be discharged to surface waters.
Clean Water Act; General Pretreatment Regulations for Existing and New Sources of Pollution	33 U.S.C. § 1251 *et seq.*; 40 C.F.R. § 403	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	Any water generated during soil excavation/ management, excavation dewatering, or construction and O&M of the caps will be treated to meet pretreatments standards if the water is to be discharged to a POTW.
Clean Water Act, National Recommended Water Quality Criteria (NRWQC)	33 U.S.C. § 1314, 40 CFR Part 131	Relevant and Appropriate	NRWQC are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Used to establish monitoring standards for surface waters and sediments, if required, for the remedial action.
Clean Air Act (CAA), Hazardous Air Pollutants; National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42.U.S.C. § 112(b)(1); 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants, including asbestos (Subpart M). Standards set for dust, asbestos abatement, and other release sources.	Remedial activities, including excavation/ management of soil, water treatment, and construction and O&M of the caps, will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. If any building demolition is required in buildings containing asbestos, asbestos abatement standards will be met. Dust standards will be complied with during excavation and management of materials within the OU.
Safe Drinking Water Act; National Primary Drinking Water Regulations, Maximum Contaminant Levels (MCLs)	42 U.S.C. § 300f *et seq.*; 40 C.F.R. 141, Subparts B and G	Relevant and Appropriate	Federal drinking waters standards used as groundwater monitoring standards when contaminated media left in place.	Groundwater monitoring standards used to assess the protectiveness of the caps.

Table D-3

Action Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Safe Drinking Water Act; National Primary Drinking Water Regulations, Maximum Contaminant Level Goals (MCLGs)	42 U.S.C. § 300f *et seq*.; 40 C.F.R. 141, Subpart F	Relevant and Appropriate for non zero MCLGs only; MCLGs set as zero are To Be Considered.	Federal drinking waters standards used as groundwater monitoring standards when contaminated media left in place.	Groundwater monitoring standards used to assess the protectiveness of the caps.
EPA Health Advisories		To Be Considered	Federal risk-based standards for groundwater used as groundwater monitoring standards when contaminated media left in place.	Risk-based standards developed using these advisories used to assess the protectiveness of the caps.
RCRA, Interim Status Treatment, Storage, and Disposal Facility Standards, Chemical, Physical and Biological Treatment	40 C.F.R. Part 265, Subpart Q	Relevant and Appropriate	Standards for operating chemical, physical and biological treatment systems, including the proper handling of reagents, system maintenance, and closure procedures.	*In situ* treatment using amendments mixed into the subsurface soils will be implemented in compliance with these standards.
Generation of investigation derived waste.	USEPA OSWER Publication 9345.3-03 FS (January 1992)	To Be Considered	Guidance on the management of Investigation-Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of these remedial alternatives will be managed based on guidance standards.
OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.	OSWER Publication 9200.2-154 (June 2015)	To Be Considered	EPA guidance for addressing vapor intrusion issues at CERCLA sites.	As part of mitigating for existing vapor intrusion pathways in soil, contaminated soil that is a vapor source will be excavated and disposed of off-site or capped, if practicable. Vapor mitigation ICs will address any remaining contaminated soil left on-site that is a vapor source.
State Standards				
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 C.M.R. 30.100	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are either listed or characteristic hazardous waste.	Any wastes generated by soil excavation, excavation dewatering, capping and monitoring activity will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste.

Table D-3

Action Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Hazardous Waste Management Rules - Requirements for Generators	310 C.M.R. 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	Any wastes generated by soil excavation, excavation dewatering, capping and monitoring activity will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities	310 C.M.R. 30.500	Applicable	General facility requirements for waste analysis, security measures, inspections, and training requirements. Section 30.580 addresses closure and Section 30.590 post-closure of hazardous waste facilities.	If hazardous waste is managed prior to off-site disposal or capped in place these facility standards will be met.
Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units	310 C.M.R. 30.605	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste if water is to be discharged to a Publicly Owned Treatment Works (POTW).	Any water generated by soil excavation, excavation dewatering, capping and monitoring activity that meets hazardous waste standards will be treated to meet pretreatment standards, if the water is to be discharged to a POTW.
Massachusetts Hazardous Waste Rules – Landfill Closure/Post Closure	310 C.M.R. 30.633	Relevant and Appropriate	Standards for capping landfills that are relevant and appropriate for capping hazardous waste left in place: (1) Provide long-term minimization of migration of liquids through the waste; (2) Function with minimum maintenance; (3) Promote drainage and minimize erosion or abrasion of the cover; (4) Accommodate settling and subsidence so that the cover's integrity is maintained; and (5) meet relevant and appropriate post-closure requirements in 310 C.M.R. 590.	If hazardous waste is capped in place these performance standards for protective caps will be met.
Massachusetts Hazardous Waste Rules, Groundwater protection	310 C.M.R. 30.660	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater.	If hazardous waste is managed prior to off-site disposal or capped in place the remedial action must prevent migration of contaminants into groundwater. *In situ* treatment using amendments mixed into the subsurface soils will be implemented in compliance with these groundwater protection standards.

Table D-3

Action Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Hazardous Waste Rules - Containers	310 C.M.R. 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 C.M.R. 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any water generated by soil excavation, soil dewatering, capping and monitoring activity will be treated to meet discharge standards if the water is to be discharged to surface waters.
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 4.00	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Used to establish monitoring standards for surface waters and sediments, if required, for the remedial action.
Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities	314 C.M.R. 8.03	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any water generated by soil excavation, soil dewatering, capping and monitoring activity that meets hazardous waste standards will be treated to meet NPDES standards if the water is to be discharged to surface waters.
Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers	314 C.M.R. 12.03(6-7),(9); 12.04(3),(6-14);12.05(1),(6) .(12-13); 12.06(1-3)	Applicable	Standards for the operation of waste water treatment works.	The water treatment system will be operated and maintained in compliance with these standards.
Prohibitions and Standards for Discharges to POTWs	314 C.M.R. 12.08	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	Any water generated by soil excavation, soil dewatering, capping and monitoring activity will be treated to meet pretreatments standards, if the water is to be discharged to a POTW.

Table D-3

Action Specific ARARs and TBCs for Soil at the Whitney Barrel, Murphy Waste Oil, and Aberjona Auto Parts Areas

Alternatives SW3, SM3, and SA3: Soil Excavation & Off-site Disposal, Capping, and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Solid Waste Rules Groundwater Monitoring	310 C.M.R. 118	Relevant and Appropriate	Solid waste facility standards for monitoring groundwater.	Monitoring of the caps will ensure that groundwater is not impaired by the capped contamination.
Massachusetts Ambient Air Quality Standards	310 C.M.R. 6.00	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Emission standards, including for dust, will be achieved during soil excavation/management, water treatment, and construction/O&M of the caps.
Massachusetts Air Pollution Control Regulations	310 C.M.R. 7.00	Applicable	These regulations set emission limits necessary to attain ambient air quality standards, including for asbestos (7.15).	Emission standards, including for dust, will be achieved during soil excavation/management, water treatment, and construction/O&M of the caps. If any building demolition is required in buildings containing asbestos, asbestos abatement standards will be met.
Massachusetts Contingency Plan, Implementation of Activity and Use Limitations	310 C.M.R. 40.1070(4)	Relevant and Appropriate	Establish standards for ICs at CERCLA sites in Massachusetts.	Institutional controls will be established consistent with State standards for enforceable restrictions on contaminated property.
Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters	Feb. 1999	To Be Considered	Guidance on controlling toxic pollutant discharges to surface waters	This guidance will be used in the establishment of monitoring standards for surface waters and sediments, if required for the remedial action.
Allowable Sound	Air Quality Control Policy #90-001	To Be Considered	Guidance on sound emissions.	To be used to assess whether any remedial measures exceed State noise guidance levels.
Massachusetts Standard References for Monitoring Wells	WSC–310-91	To Be Considered	Guidance on locating, drilling, installing, sampling and decommissioning monitoring wells.	Monitoring wells will be installed, maintained and decommissioned based on guidance standards.
Erosion and Sediment Control Guidance		To Be Considered	Guidance on preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

Table D-4
Chemical-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Safe Drinking Water Act; National primary drinking water regulations, Maximum Contaminant Levels	42 U.S.C. § 300f *et seq*.; 40 C.F.R. 141, Subparts B and G	Relevant and Appropriate	Establishes Maximum Contaminant Levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate standards for aquifers and surface water bodies that are potential drinking water sources.	This alternative would prevent exposure to NAPL in groundwater that exceeds these standards through: excavation and off-site disposal of NAPL and NAPL-contaminated media, to the extent practicable; treatment of water generated from dewatering excavations and excavated material; and monitoring/ICs to prevent exposure to any remnant NAPL until it no longer exceeds regulatory standards due to natural attenuation and concurrent remedial measures for soil and groundwater.
Safe Drinking Water Act; National primary drinking water regulations, Maximum Contaminant Level Goals	42 U.S.C. § 300f *et seq*.; 40 C.F.R. 141, Subpart F	Relevant and Appropriate for non zero MCLGs only; MCLGs set as zero are To Be Considered	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	This alternative would prevent exposure to NAPL in groundwater that exceeds these standards through: excavation and off-site disposal of NAPL and NAPL-contaminated media, to the extent practicable; treatment of water generated from dewatering excavations and excavated material; and monitoring/ICs to prevent exposure to any remnant NAPL until it no longer exceeds regulatory standards due to natural attenuation and concurrent remedial measures for soil and groundwater.
EPA Health Advisories		To Be Considered	EPA publishes contaminant-specific health advisories that indicate the non-carcinogenic risks associated with consuming contaminated drinking water. Used to develop risk-based cleanup standards.	This alternative would prevent exposure to NAPL contaminants in groundwater and soil which contribute to a calculated non-carcinogenic risk, developed using this guidance through: skimming and off-site disposal of NAPL to the extent practicable; treatment of water generated from dewatering excavations and excavated material;, and monitoring/ICs to prevent exposure to any remnant NAPL until it no longer poses a risk due to natural attenuation and concurrent remedial measures for soil and groundwater.

Table D-4
Chemical-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Guidelines for Carcinogenic Risk Assessment	EPA/630/P-03/001F	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	This alternative would prevent exposure to NAPL contaminants which contribute to a calculated carcinogenic risk, developed using this guidance, through: 1) excavation of NAPL and off-site disposal, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant NAPL no longer poses a commercial/industrial risk; and 3) ICs to prevent residential development. Additional NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F	To Be Considered	This provides guidance on assessing risk to children from carcinogens.	This alternative would prevent exposure to NAPL contaminants which contribute to a calculated carcinogenic risk to children, developed using this guidance through: 1) excavation of NAPL and off-site disposal, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant NAPL no longer poses a commercial/industrial risk; and 3) ICs to prevent residential development. Additional NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.
EPA Risk Reference Doses (RfDs)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	This alternative would prevent exposure to NAPL contaminants which contribute to a calculated non-carcinogenic risk, developed using this guidance through: 1) excavation of NAPL and off-site disposal, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant NAPL no longer poses a commercial/industrial risk; and 3) ICs to prevent residential development. Additional NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.

Table D-4
Chemical-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Human Health Assessment Cancer Slope Factors (CSFs)		To Be Considered	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	This alternative would prevent exposure to NAPL contaminants which contribute to a calculated carcinogenic risk, developed using this guidance through: 1) excavation of NAPL and off-site disposal, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant NAPL no longer poses a commercial/industrial risk; and 3) ICs to prevent residential development. Additional NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.
EPA Carcinogenic Assessment Group Potency Factors		To Be Considered	These factors are used to evaluate an acceptable risk from a carcinogen.	This alternative would prevent exposure to NAPL contaminants which contribute to a calculated carcinogenic risk, developed using this guidance through: 1) excavation of NAPL and off-site disposal, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant NAPL no longer poses a commercial/industrial risk; and 3) ICs to prevent residential development. Additional NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.
Updated Scientific Considerations for Lead in Soil Cleanups	EPA OLEM Directive 9200.2-167	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil. Used to develop site-specific risk-based standards. Recommends evaluating potential risks from exposures to lead at a Superfund site at a target blood lead level lower than 10 µg/dL..	This alternative would prevent exposure to lead in NAPL which contributes to a calculated risk, developed using this guidance through: 1) excavation and off-site disposal of lead-contaminated NAPL, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant lead-contaminated NAPL no longer poses a commercial/ industrial risk; and 3) ICs to prevent residential development. Additional lead-contaminated NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.

Table D-4
Chemical-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil	EPA-540-R-03-001 (January 2003)	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	This alternative would prevent exposure to lead in NAPL which contributes to a calculated risk, developed using this guidance through: 1) excavation and off-site disposal of lead-contaminated NAPL, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant lead-contaminated NAPL no longer poses a commercial/ industrial risk; and 3) ICs to prevent residential development. Additional lead-contaminated NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.
Guidance on Remedial Actions for Superfund Sites with PCB Contamination	EPA-540-G-90-007 (August 1990)	To Be Considered	EPA Guidance for evaluating risks posed by PCBs at Superfund sites. Used to develop risk-based cleanup standards.	This alternative would prevent exposure to PCBs in -NAPL which contributes to a calculated risk, developed using this guidance through: 1) excavation of PCB-contaminated NAPL and off-site disposal, to the extent practicable, to address commercial/industrial exposure; 2) monitoring to assess when exposure to any remnant NAPL no longer poses a commercial/industrial risk; and 3) ICs to prevent residential development. Additional PCB-contaminated NAPL is expected to be removed during concurrent remedial measures for soil and groundwater.
State Standards				
Massachusetts Drinking Water Regulations	310 C.M.R. 22.00	Relevant and Appropriate	Establishes maximum contaminant levels that apply to public drinking water supplies. MA Maximum Contaminant Levels and Maximum Contaminant Level Goals are specified for numerous contaminants, including inorganic and organic chemicals. For the most part, the numerical criteria are identical to Federal SDWA MCLs and MCLGs, although there are several additional chemicals that have criteria.	This alternative would prevent exposure to NAPL in groundwater that exceeds these State standards through: excavation and off-site disposal of NAPL and NAPL-contaminated media, to the extent practicable; treatment of water generated from dewatering excavations and excavated material; and monitoring/ICs to prevent exposure to any remnant NAPL until it no longer exceeds regulatory standards due to natural attenuation and concurrent remedial measures for soil and groundwater.

Table D-5
Location-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Floodplain Management and Protection of Wetlands	44 C.F.R. 9	Relevant and Appropriate	FEMA regulations that set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands). Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Requires the avoidance of impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain and to avoid development within floodplain wherever there is a practicable alternative. An assessment of impacts to 500-year floodplain is required for critical actions – which includes siting waste facilities in a floodplain. Requires public notice when proposing any action in or affecting floodplain or wetlands.	If there is no practicable alternative method to work in federal jurisdictional wetlands, then all practicable measures will be taken to minimize and mitigate any adverse impacts. Erosion and sedimentation control measures will be adopted during excavation, material management, and restoration activities to protect federal jurisdictional wetlands. Standards for excavating and managing contaminated NAPL/soil within the regulated 500-year floodplain will be attained. After completion of the work, there will be no significant net loss of flood storage capacity and no significant net increase in flood stage or velocities. Floodplain habitat will be restored, to the extent practicable. Public comment was solicited as part of the Proposed Plan concerning the proposed alteration to wetlands and floodplain and no negative comments were received.
Resource Conservation and Recovery Act (RCRA) Floodplain Restrictions for Hazardous Waste Facilities	42 U.S.C. §§ 6901 *et seq.*; 40 C.F.R. § 264.18(b)	Applicable	A hazardous waste treatment, storage, or disposal facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or to result in no adverse effects on human health or the environment if washout were to occur.	To the extent any hazardous waste is generated from the excavation activities the material will be managed so that it will not impact floodplain resources.

Table D-5

Location-Specific ARARs and TBCs for NAPL

Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
RCRA Floodplain Restrictions for Solid Waste Disposal Facilities and Practices	40 C.F.R. § 257.3-1	Applicable	Solid waste practices must not restrict the flow of a 100-year flood, reduce the temporary water storage capacity of the floodplain or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.	Any solid waste generated from the excavation activities will be managed so that it will not impact floodplain resources.
Clean Water Act §404, and regulations	33 U.S.C. 1344, 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323	Applicable	For discharge of dredged or fill material into water bodies or wetlands, there must be no practical alternative with less adverse impact on aquatic ecosystem; discharge cannot cause or contribute to violation of state water quality standard or toxic effluent standard or jeopardize threatened or endangered (T&E) species; discharge cannot significantly degrade waters of U.S.; must take practicable steps to minimize and mitigate adverse impacts; must evaluate impacts on flood level, flood velocity, and flood storage capacity. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources. EPA must determine which alternative is the "Least Environmentally Damaging Practicable Alternative" (LEDPA) to protect wetland and aquatic resources.	Under this alternative excavation of contaminated NAPL/soil may possibly impact federal jurisdictional wetlands. Activities effecting wetlands will be conducted in accordance with these requirements including, but not limited to, mitigation and/or restoration. EPA has determined this alternative is the LEDPA because (a) there is no practical alternative method that will achieve cleanup objectives with less adverse impact and (b) all practical measures would be taken to minimize and mitigate any adverse impacts from the work. Public comment was solicited on EPA's LEDPA finding in the Proposed Plan and no negative comments were received.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 662, 663	Applicable	Requires consultation with appropriate agencies to protect fish and wildlife when federal actions may alter waterways. Must develop measures to prevent and mitigate potential loss to the maximum extent possible.	Consultation with appropriate federal agencies will be maintained during planning and implementation of the remedial alternative that may alter protected resource areas

Table D-5
Location-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
National Historical Preservation Act,	16 U.S.C. 469 *et seq.*; 36 C.F.R. Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the Act will be met.	Any undisturbed areas altered by the NAPL/soil excavation activities will be assessed to ensure no protected resource areas are present. If present there will be consultation with federal and state preservation officials to address measures to avoid, minimize and/or mitigate any impacts to protected resource areas.
U.S. Army Corps of Engineers, New England District Compensatory Mitigation Guidance (09-07-2016)		To Be Considered	This Guidance is to be considered when compensatory mitigation to address impacts to federal jurisdictional wetlands is appropriate for a particular remedial activity.	Under this alternative excavation of contaminated NAPL/soil may possibly impact federal jurisdictional wetlands. Activities effecting federal jurisdictional wetlands will be conducted in accordance with these guidance standards for mitigation and/or restoration.
State Standards				
Massachusetts Wetlands Protection Act and Regulations	MGL c. 131 § 40, 310 C.M.R. 10.00	Applicable	Regulations restrict dredging, filling, altering, or polluting inland wetland resource areas and impose performance standards for work in such areas (including 10.05(6)(k) (stormwater management). Protected resource areas include: 10.54 (Bank); 10.55 (Bordering Vegetated Wetlands); 10.56 (Land under Water); 10.57 (Bordering Land subject to Flooding); and 10.58 (Riverfront Area).	Under this alternative NAPL/soil excavation and excavated material management may possibly impact state regulated wetland resource areas and buffer zones. Any remedial action conducted within 100 feet of a state regulated wetland resource area and 200 feet from a perennial stream will comply with these regulations. Mitigation of impacts on State wetland resource areas will be addressed.

Table D-5

Location-Specific ARARs and TBCs for NAPL

Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Clean Water Act; Water Quality Certification for Discharge of Dredged or Fill Material	M.G.L. ch.21, §§ 26-53; 314 C.M.R. §9.00	Applicable	Regulates discharges of dredged or fill material to protect aquatic ecosystems.	Any required dredging/filling of wetlands resulting from the excavation of NAPL and NAPL-contaminated materials will be conducted so as to not impair surface water quality.
Massachusetts Hazardous Waste Regulations, Location Standards for Land Subject to Flooding	310 C.M.R. 30.701	Applicable	Any new or expanding hazardous waste storage or treatment facility (which only receives hazardous waste from on-site sources), the active portion of which is located within the boundary of land subject to flooding from the statistical 100-year frequency storm, shall be floodproofed. Floodproofing shall be designed, constructed, operated and maintained to prevent floodwaters from coming into contact with hazardous waste.	To the extent any hazardous waste is generated from the excavation activities the material will be managed so that it will not impact floodplain resources.
Antiquities Act and Regulations	M.G.L. ch. 9, §§26-27; 950 C.M.R. 71.00	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, limit, or mitigate adverse effects to properties listed in the register of historic places. Establishes coordination with the National Historic Preservation Act.	Any undisturbed areas altered by the NAPL/soil excavation activities will be assessed to ensure no protected resource areas are present. If present there will be consultation with federal and state preservation officials to address measures to avoid, minimize and/or mitigate any impacts to protected resource areas.

Table D-6
Action-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure	42 U.S.C. §6901 *et seq.*; 40 C.F.R. Parts 260-262 and 264	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State. Federal financial assurance requirements are defined at 40 C.F.R. 264.143.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. All NAPL meeting either listed or characteristic hazardous waste standards will be excavated and disposed of off-site at a licensed facility. Releases from regulated hazardous waste facilities will be addressed under applicable closure/post closure standards, including financial assurance requirements.
Toxic Substances Control Act (TSCA); PCB Remediation Waste	15 U.S.C. 2601 *et seq.;* 40 C.F.R. 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	The Record of Decision contains a finding by EPA (Appendix E) that excavation of all PCB-contaminated NAPL that exceeds risk-based PCB standards, to the extent practicable; proper management of excavated material; and monitoring/ICs to prevent exposure to any remnant NAPL (until it no longer poses a risk due to natural attenuation and concurrent remedial measures for soil and groundwater) will prevent an unreasonable risk to human health or the environment as long as required protective conditions in the determination are met. Remedial measures will be based on *in-situ* PCB concentrations in NAPL and NAPL-contaminated media.

Table D-6

Action-Specific ARARs and TBCs for NAPL

Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 C.F.R. Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any water generated during NAPL excavation or dewatering activities (if required) will be treated to meet NPDES standards if the water is to be discharged to surface waters. Stormwater standards will be met if over an acre is altered by the remedial action.
Clean Water Act; Toxic Pollutant Effluent Standards	40 CFR 129	Applicable	Regulates surface water discharges of specific toxic pollutants, specifically certain pesticides and PCBs.	Any water contaminated with the specific toxic pollutants addressed by this regulation generated during NAPL excavation or dewatering activities (if required) will be treated to meet applicable toxic pollutant discharge standards if the water is to be discharged to surface waters.
Clean Water Act; General Pretreatment Regulations for Existing and New Sources of Pollution	33 U.S.C. § 1251 *et seq.*; 40 C.F.R. § 403	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	Any water generated during NAPL excavation or dewatering activities (if required) will be treated to meet pretreatments standards if the water is to be discharged to a POTW.
Clean Water Act, National Recommended Water Quality Criteria	33 U.S.C. § 1314, 40 CFR Part 131	Relevant and Appropriate	NRWQC are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Used to establish monitoring standards for surface waters and sediments, if required for the remedial action.
Clean Air Act (CAA), Hazardous Air Pollutants; National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42.U.S.C. § 112(b)(1); 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants, including asbestos (Subpart M). Standards set for dust, asbestos abatement, and other release sources.	Remedial activities, including excavation of NAPL and possible treatment of NAPL prior to off-site disposal will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. If any building demolition is required in buildings containing asbestos, asbestos abatement standards will be met. Dust standards will be complied with during excavation and management of materials within the OU.

Table D-6
Action-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
RCRA, Air Emission Standards for Process Vents	40 C.F.R. Part 264, Subpart AA	Applicable, if VOC emissions over 10 ppm or greater; Relevant and Appropriate, if less than 10 ppm	RCRA emissions standards not delegated to the State. Standards for process vents for systems that treat RCRA wastes that have total organic concentrations of 10 ppm or greater.	Possible treatment of NAPL prior to off-site disposal will be implemented in accordance with these air emission rules. No air emissions from remedial activities will cause air quality standards to be exceeded.
RCRA, Air Emission Standards for Equipment Leaks	40 C.F.R. Part 264, Subpart BB	Applicable, if VOC emissions over10 ppm or greater; Relevant and Appropriate, if less than 10 ppm	RCRA emissions standards not delegated to the State. Standards for air equipment leaks for systems that treat RCRA wastes that have total organic concentrations of 10 ppm or greater.	Possible treatment of NAPL prior to off-site disposal will be implemented in accordance with these air emission rules. No air emissions from remedial activities will cause air quality standards to be exceeded.
Generation of investigation derived waste.	USEPA OSWER Publication 9345.3-03 FS (January 1992)	To Be Considered	Guidance on the management of Investigation-Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of this remedial alternative will be managed based on guidance standards.
OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.	OSWER Publication 9200.2-154 (June 2015)	To Be Considered	EPA guidance for addressing vapor intrusion issues at CERCLA sites.	As part of mitigating for existing vapor intrusion pathways, NAPL that is a vapor source will be excavated and disposed of off-site, if practicable. Vapor mitigation ICs will address any remaining NAPL left on-site that is a vapor source.

Table D-6
Action-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Standards				
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 C.M.R. 30.100	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are either listed or characteristic hazardous waste.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste.
Massachusetts Hazardous Waste Management Rules - Requirements for Generators	310 C.M.R. 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal	To the extent any remedial activity generates hazardous wastes, the waste will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities	310 C.M.R. 30.500	Applicable	General facility requirements for waste analysis, security measures, inspections, and training requirements. Section 30.580 addresses closure and Section 30.590 post-closure of hazardous waste facilities.	If any remedial activity generates hazardous wastes, on-site facilities used to handle the waste will be managed in accordance with the substantive requirements of these regulations. Removal of all NAPL exceeding hazardous waste standards will meet closure/post closure requirements for releases from current or formerly active hazardous waste facilities.
Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units	310 C.M.R. 30.605	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	Any water generated during NAPL excavation or dewatering activities (if required) that meets hazardous waste standards will be treated to meet pretreatments standards, if the water is to be discharged to a POTW.
Massachusetts Hazardous Waste Rules, Groundwater protection	310 C.M.R. 30.660	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater.	Excavation and off-site disposal of NAPL which qualifies as hazardous waste will protect groundwater quality. Any hazardous waste generated by the remedial alternative will be managed to prevent contaminant migration to groundwater.

Table D-6
Action-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Hazardous Waste Rules - Containers	310 C.M.R. 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 C.M.R. 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities	314 C.M.R. 8.03	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any water generated during NAPL excavation or dewatering activities (if required) that meets hazardous waste standards will be treated to meet NPDES standards if the water is to be discharged to surface waters.
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any water generated during NAPL excavation or dewatering activities (if required) will be treated to meet discharge standards if the water is to be discharged to surface waters.
Prohibitions and Standards for Discharges to POTWs	324 C.M.R. 12.08	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	Any water generated during NAPL excavation or dewatering activities (if required) will be treated to meet pretreatments standards if the water is to be discharged to a POTW.
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 4.00)	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Used to establish monitoring standards for surface waters and sediments, if required for the remedial action.

Table D-6
Action-Specific ARARs and TBCs for NAPL
Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Ambient Air Quality Standards	310 C.M.R. 6.00	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including excavation and management of NAPL and any NAPL treatment will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials at the OU.
Massachusetts Air Pollution Control Regulations	310 C.M.R. 7.00	Applicable	These regulations set emission limits necessary to attain ambient air quality standards, including for asbestos (7.15).	Remedial activities, including excavation and management of NAPL and any NAPL treatment will be implemented in accordance with these rules. If any building demolition is required in buildings containing asbestos, asbestos abatement standards will be met. No air emissions from remedial activities will cause air quality standards to be exceeded.
Massachusetts Contingency Plan, NAPL	310 C.M.R. 40.1003(7)	Relevant and Appropriate	Establish standards for remedial actions taken to adequately contain or remove NAPL	Excavation and off-site disposal of NAPL will address these standards, to the extent practicable. Any remnant NAPL left in place will be subject to monitoring/ICs to prevent human exposure and migration to adjacent wetlands. Any remnant NAPL may also be addressed by the groundwater component and soil component of the remedy.
Massachusetts Contingency Plan, Implementation of Activity and Use Limitations	310 C.M.R. 40.1070(4)	Relevant and Appropriate	Establish standards for institutional controls at CERCLA sites in Massachusetts.	Institutional controls will be established consistent with State standards for enforceable restrictions on contaminated property to prevent human contact with NAPL and to protect remedial infrastructure.
Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters	Feb. 1999	To Be Considered	Guidance on controlling toxic pollutant discharges to surface waters	This guidance will be used in the establishment of monitoring standards for surface waters and sediments, if required for the remedial action.

Table D-6

Action-Specific ARARs and TBCs for NAPL

Alternative N-3: Excavation and Off-site Disposal

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Light Non Aqueous Phase Liquid (LNAPL) and the MCP: Guidance for Site Assessment and Closure	MassDEP Policy #WSC-16-450	To Be Considered	Guidance on assessing and remediating LNAPL.	Excavation and off-site disposal of NAPL will follow this guidance, to the extent practicable. Any remnant NAPL left in place will be subject to monitoring/ICs to prevent human exposure and migration to adjacent wetlands. Any remnant NAPL may also be addressed by the groundwater component and soil component of the remedy.
Allowable Sound	MassDEP Division of Air Quality Control Policy #90-001	To Be Considered	Guidance on sound emissions.	To be used to assess whether any remedial measures exceed State noise guidance levels.
Erosion and Sediment Control Guidance		To Be Considered	Guidance on preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

Table D-7
Chemical-Specific ARARs and TBCs for SWP-Wide Groundwater
Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Safe Drinking Water Act (SDWA); National primary drinking water regulations, Maximum Contaminant Levels (MCLs)	42 U.S.C. § 300f *et seq.*; 40 C.F.R. 141, Subparts B and G	Applicable	Establishes MCLs for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate standards for aquifers and surface water bodies that are potential drinking water sources.	Institutional controls (ICs) will prevent exposure to groundwater that exceeds these standards until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
Safe Drinking Water Act; National primary drinking water regulations, Maximum Contaminant Level Goals (MCLGs)	42 U.S.C. § 300f *et seq.*; 40 C.F.R. 141, Subpart F	Relevant and Appropriate for non zero MCLGs only; MCLGs set as zero are To Be Considered.	Establishes MCLGs for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	ICs will prevent exposure to groundwater that exceeds these standards until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
EPA Health Advisories		To Be Considered	EPA publishes contaminant-specific health advisories that indicate the non-carcinogenic risks associated with consuming contaminated drinking water. Used to develop risk-based cleanup standards.	ICs will prevent exposure to groundwater that exceeds calculated non-carcinogenic risk-based standards developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
Guidelines for Carcinogenic Risk Assessment	EPA/630/ P-03/001F	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	ICs will prevent exposure to groundwater that exceeds calculated carcinogenic risk-based standards developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/ R-03/003F	To Be Considered	This provides guidance on assessing risk to children from carcinogens.	ICs will prevent exposure to groundwater that exceeds calculated carcinogenic risk-based standards for children developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.

Table D-7
Chemical-Specific ARARs and TBCs for SWP-Wide Groundwater
Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
EPA Risk Reference Doses (RfDs)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	ICs will prevent exposure to groundwater that exceeds calculated non-carcinogenic risk-based standards developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
Human Health Assessment Cancer Slope Factors (CSFs)		To Be Considered	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	ICs will prevent exposure to groundwater that exceeds calculated carcinogenic risk-based standards developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
EPA Carcinogenic Assessment Group Potency Factors		To Be Considered	These factors are used to evaluate an acceptable risk from a carcinogen.	ICs will prevent exposure to groundwater that exceeds calculated carcinogenic risk-based standards developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
Guidance on Remedial Actions for Superfund Sites with Polychlorinated Biphenyl (PCB) Contamination	EPA-540-G-90-007 (August 1990)	To Be Considered	EPA Guidance for evaluating risks posed by PCBs at Superfund sites. Used to develop risk-based cleanup standards.	ICs will prevent exposure to groundwater that exceeds calculated risk-based standards for PCBs in groundwater developed using this guidance until groundwater cleanup standards are achieved through pumping and treatment within 18 years.
Ontario Ministry of Environment and Energy (OMEE) Lowest Effect Levels (LELs) for Freshwater Sediments	(Persaud *et al*., 1993)	To Be Considered	The SEL value is the concentration at which the majority of the sediment-dwelling organisms are not affected. Used to develop risk-based cleanup standards.	Pump and Treat will prevent migration of contaminated groundwater into the wetlands which contributes to a calculated ecological risk, developed using this guidance.
Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Probable Effects Concentrations (PECs)	(MacDonald et al., 2000)	To Be Considered	The PEC value is the concentration above which the adverse effects on sediment-dwelling organisms are likely to occur. Used to develop risk-based cleanup standards.	Pump and Treat will prevent migration of contaminated groundwater into the wetlands which contributes to a calculated ecological risk, developed using this guidance.

Table D-7
Chemical-Specific ARARs and TBCs for SWP-Wide Groundwater
Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Standards				
Massachusetts Drinking Water Regulations	310 C.M.R. 22.00	Relevant and Appropriate	Establishes maximum contaminant levels that apply to public drinking water supplies. Massachusetts MCLs and MCLGs are specified for numerous contaminants, including inorganic and organic chemicals. For the most part, the numerical criteria are identical to Federal SDWA MCLs and MCLGs, although there are several additional chemicals that have criteria.	ICs will prevent exposure to groundwater that exceeds these standards until groundwater cleanup standards are achieved through pumping and treatment within 18 years.

Table D-8
Location-Specific ARARs and TBCs for SWP-Wide Groundwater
Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Floodplain Management and Protection of Wetlands	44 C.F.R. 9	Relevant and Appropriate	Federal Emergency Management Agency (FEMA) regulations that set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands). Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Requires the avoidance of impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain and to avoid development within floodplain wherever there is a practicable alternative. An assessment of impacts to 500-year floodplain is required for critical actions – which includes siting waste facilities in a floodplain. Requires public notice when proposing any action in or affecting floodplain or wetlands.	If there is no practicable alternative method to work in federal jurisdictional wetlands while installing, maintaining and sampling monitoring/extraction wells, access ways, and treatment systems then all practicable measures will be taken to minimize and mitigate any adverse impacts. Erosion and sedimentation control measures will be adopted during installation and maintenance activities to protect federal jurisdictional wetlands. Standards for installing, maintaining and sampling monitoring/extraction wells, access ways, and treatment systems within the regulated 500-year floodplain will be attained. After completion of the work, there will be no significant net loss of flood storage capacity and no significant net increase in flood stage or velocities. Floodplain habitat will be restored, to the extent practicable. Public comment was solicited as part of the Proposed Plan concerning the proposed alteration to wetlands and floodplain and no negative comments were received.
Resource Conservation and Recovery Act (RCRA) Floodplain Restrictions for Hazardous Waste Facilities	42 U.S.C. §§ 6901 *et seq.*; 40 C.F.R. § 264.18(b)	Applicable	A hazardous waste treatment, storage, or disposal facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or to result in no adverse effects on human health or the environment if washout were to occur.	To the extent any hazardous waste is generated from the installation and maintenance of monitoring/extraction wells, access ways, and treatment systems it will be managed so that it will not impact floodplain resources.
RCRA Floodplain Restrictions for Solid Waste Disposal Facilities and Practices	40 C.F.R. § 257.3-1	Applicable	Solid waste practices must not restrict the flow of a 100-year flood, reduce the temporary water storage capacity of the floodplain or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.	Any solid waste generated from the installation and maintenance of monitoring/extraction wells, access ways, and treatment systems will be managed so that it will not impact floodplain resources.

Table D-8
Location-Specific ARARs and TBCs for SWP-Wide Groundwater
Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Clean Water Act §404, and regulations	33 U.S.C. 1344, 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323	Applicable	For discharge of dredged or fill material into water bodies or wetlands, there must be no practical alternative with less adverse impact on aquatic ecosystem; discharge cannot cause or contribute to violation of state water quality standard or toxic effluent standard or jeopardize threatened or endangered (T&E) species; discharge cannot significantly degrade waters of U.S.; must take practicable steps to minimize and mitigate adverse impacts; must evaluate impacts on flood level, flood velocity, and flood storage capacity. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources. EPA must determine which alternative is the "Least Environmentally Damaging Practicable Alternative" (LEDPA) to protect wetland and aquatic resources.	Under this alternative installation and maintenance of monitoring/extraction wells, access ways, and treatment systems may possibly impact federal jurisdictional wetlands. Activities effecting wetlands will be conducted in accordance with these requirements including, but not limited to, mitigation and/or restoration. EPA has determined that the alternative is the LEDPA because (a) there is no practical alternative method that will achieve cleanup objectives with less adverse impact and (b) all practical measures would be taken to minimize and mitigate any adverse impacts from the work. Public comment was solicited on EPA's LEDPA finding in the Proposed Plan and no negative comments were received.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 662, 663	Applicable	Requires consultation with appropriate agencies to protect fish and wildlife when federal actions may alter waterways. Must develop measures to prevent and mitigate potential loss to the maximum extent possible.	Consultation with appropriate federal agencies will be maintained during planning and implementation of the remedial alternative that may alter protected resource areas
National Historical Preservation Act (NHPA)	16 U.S.C. 469 *et seq.*; 36 C.F.R. Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the NHPA will be met.	Any undisturbed areas where monitoring/extraction wells, access ways, and treatment systems will be constructed will be assessed to ensure no protected resource areas are present. If present there will be consultation with federal and state preservation officials to address measures to avoid, minimize and/or mitigate any impacts to protected resource areas.
U.S. Army Corps of Engineers, New England District Compensatory Mitigation Guidance (09-07-2016)		To Be Considered	This Guidance is to be considered when compensatory mitigation to address impacts to federal jurisdictional wetlands is appropriate for a particular remedial activity.	Under this alternative installation and maintenance of monitoring/extraction wells, access ways, and treatment systems may possibly impact federal jurisdictional wetlands. Activities effecting federal jurisdictional wetlands will be conducted in accordance with these guidance standards for mitigation and/or restoration.

Table D-8
Location-Specific ARARs and TBCs for SWP-Wide Groundwater
Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Standards				
Massachusetts Wetlands Protection Act and Regulations	MGL c. 131 § 40, 310 C.M.R. 10.00	Applicable	Regulations restrict dredging, filling, altering, or polluting inland wetland resource areas and impose performance standards for work in such areas (including 10.05(6)(k) (stormwater management). Protected resource areas include: 10.54 (Bank); 10.55 (Bordering Vegetated Wetlands); 10.56 (Land under Water); 10.57 (Bordering Land subject to Flooding); and 10.58 (Riverfront Area).	Under this alternative installation and maintenance of monitoring/extraction wells, access ways, and treatment systems may possibly impact state regulated wetland resource areas and buffer zones. Alternatives requiring that work be completed within 100 feet of a state regulated wetland and 200 feet from a perennial stream will comply with these regulations. Mitigation of impacts on State wetland resource areas will be addressed.
Antiquities Act and Regulations	M.G.L. ch. 9, §§26-27; 950 C.M.R. 71.00	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, limit, or mitigate adverse effects to properties listed in the register of historic places. Establishes coordination with the NHPA.	Any undisturbed areas where monitoring/extraction wells, access ways, and treatment systems will be constructed will be assessed to ensure no protected resource areas are present. If present there will be consultation with federal and state preservation officials to address measures to avoid, minimize and/or mitigate any impacts to protected resource areas.
Massachusetts Hazardous Waste Regulations, Location Standards for Land Subject to Flooding	310 C.M.R. 30.701	Applicable	Any new or expanding hazardous waste storage or treatment facility (which only receives hazardous waste from on-site sources), the active portion of which is located within the boundary of land subject to flooding from the statistical 100-year frequency storm, shall be flood-proofed. Flood-proofing shall be designed, constructed, operated and maintained to prevent floodwaters from coming into contact with hazardous waste.	To the extent any hazardous waste is generated from the installation and maintenance of monitoring wells/extraction, access ways, and treatment systems it will be managed so that it will not impact floodplain resources.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure	42 U.S.C. §6901 *et seq.*; 40 C.F.R. Parts 260-262 and 264	Applicable	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State. Federal financial assurance requirements are defined at 40 C.F.R. 264.143.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. Any discharges and filter media from the pump and treat system, as well as contaminated soil/sediment from extraction/monitoring well drilling or maintenance, meeting either listed or characteristic hazardous waste standards will be disposed of off-site at a licensed facility. Releases from regulated hazardous waste facilities will be addressed under applicable closure/post closure standards, including financial assurance requirements.
RCRA, Air Emission Standards for Process Vents	40 C.F.R. Part 264, Subpart AA	Applicable, if volatile organic compounds (VOC) emissions over 10 parts per million (ppm) or greater; Relevant and Appropriate, if less than 10 ppm	RCRA emissions standards not delegated to the State. Standards for process vents for air treatment systems for RCRA wastes that have total organic concentrations of 10 ppm or greater.	If air treatment of VOCs is required, emission standards for any process vents, if present, will be achieved.
RCRA, Air Emission Standards for Equipment Leaks	40 C.F.R. Part 264, Subpart BB	Applicable, if VOC emissions over10 ppm or greater; Relevant and Appropriate, if less than 10 ppm	RCRA emissions standards not delegated to the State. Standards for preventing air equipment leaks for systems that treat RCRA wastes that have total organic concentrations of 10 ppm or greater.	Standards for preventing air emission leaks from treatment systems for VOCs will be achieved.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Toxic Substances Control Act (TSCA); Polychlorinated biphenyl (PCB) Remediation Waste	15 U.S.C. 2601 *et seq.;* 40 C.F.R. 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	Any PCB contaminated soil/sediment from extraction/ monitoring well drilling or maintenance, as well as any PCB contaminated discharge or filter media from the pump and treat system, exceeding human health risk standards or ecological risk standards will be disposed of off-site. Institutional controls will prevent residential exposure to PCB-contaminated groundwater until the pump and treat system achieves unrestricted use standards. Remedial measures will be based on *in-situ* PCB concentrations in soil/sediment/ groundwater. EPA has issued a determination (Appendix E) that the selected remedy will not pose an unreasonable risk of injury to health or the environment as long as required protective conditions in the determination are met.
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 C.F.R. Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the United States (U.S.). Also, includes stormwater standards for activities disturbing more than one acre.	Any water generated from the pump and treat system and during installation and management of monitoring/extraction wells will be treated to meet NPDES standards if the water is to be discharged to surface waters.
Clean Water Act; Toxic Pollutant Effluent Standards	40 CFR 129	Applicable	Regulates surface water discharges of specific toxic pollutants, specifically certain pesticides and PCBs.	Any water generated from the pump and treat system and during installation and management of monitoring/extraction wells will be treated to meet applicable toxic pollutant discharge standards (if regulated contaminants are present) if the water is to be discharged to surface waters.
Clean Water Act; General Pretreatment Regulations for Existing and New Sources of Pollution	33 U.S.C. § 1251 *et seq.*; 40 C.F.R. § 403	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	Any water generated from the pump and treat system and during installation and management of monitoring/extraction wells will be treated to pretreatment standards if the water is to be discharged to a POTW.
Clean Water Act, National Recommended Water Quality Criteria (NRWQC)	33 U.S.C. § 1314, 40 CFR Part 131	Relevant and Appropriate	NRWQC are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Used to establish monitoring standards for surface waters and sediments, if required for the remedial action.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	**Citation**	**Status**	**Requirement Synopsis**	**Action to be Taken to Attain Requirement**
Clean Air Act (CAA), Hazardous Air Pollutants; National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42.U.S.C. § 112(b)(1); 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	Remedial activities, including air discharges from the pump and treat system and excavation and management of monitoring/extraction wells, will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials within the OU.
Safe Drinking Water Act; National primary drinking water regulations, Maximum Contaminant Levels	42 U.S.C. § 300f *et seq*.; 40 C.F.R. 141, Subparts B and G	Applicable	Federal drinking waters standards used as groundwater monitoring standards when contaminated media left in place.	Standards used as groundwater monitoring standards until groundwater cleanup is achieved.
Safe Drinking Water Act; National primary drinking water regulations, Maximum Contaminant Level Goals	42 U.S.C. § 300f *et seq*.; 40 C.F.R. 141, Subpart F	Relevant and Appropriate for non zero MCLGs only; MCLGs set as zero are To Be Considered.	Federal drinking waters standards used as groundwater monitoring standards when contaminated media left in place.	Standards used as groundwater monitoring standards until groundwater cleanup is achieved.
EPA Health Advisories		To Be Considered	Federal risk-based standards for groundwater used as groundwater monitoring standards when contaminated media left in place.	Risk-based standards developed using these advisories used as groundwater monitoring standards until groundwater cleanup is achieved.
Summary of Key Existing EPA Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Policies for Groundwater Restoration	OSWER Directive 9283.1-33 (June 26, 2009)	To Be Considered	Guidance on developing groundwater remedies at CERCLA sites.	Groundwater remediation standards called for in this guidance will be satisfied as long as groundwater cleanup will be achieved through operating the pump and treat system within 18 years and Institutional Controls (ICs) are established that will prevent exposure to contaminated groundwater until cleanup standards are achieved.
Generation of investigation derived waste.	USEPA OSWER Publication 9345.3-03 FS (January 1992)	To Be Considered	Guidance on the management of Investigation-Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of this remedial alternative will be managed based on guidance standards.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.	OSWER Publication 9200.2-154 (June 2015)	To Be Considered	EPA guidance for addressing vapor intrusion issues at CERCLA sites.	Institutional controls will be implemented to prevent potential vapor exposures until groundwater cleanup standards are achieved through operation of the pump and treat system.
State Standards				
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 C.M.R. 30.100	Applicable	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are either listed or characteristic hazardous waste.	Any wastes generated by remedial activity will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste. Non-hazardous materials will be disposed appropriately. Any discharges and filter media from the pump and treat system, as well as contaminated soil/sediment from extraction/monitoring well drilling or maintenance, meeting either listed or characteristic hazardous waste standards will be disposed of off-site at a licensed facility.
Massachusetts Hazardous Waste Management Rules - Requirements for Generators	310 C.M.R. 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal	If any remedial activity generates hazardous wastes, the waste will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities	310 C.M.R. 30.500	Applicable	General facility requirements for waste analysis, security measures, inspections, and training requirements. Section 30.580 addresses closure and Section 30.590 post-closure of hazardous waste facilities.	If any remedial activity generates hazardous wastes, on-site facilities used to handle the waste will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Special requirements for wastewater treatment units	310 C.M.R. 30.605	Relevant and Appropriate	Standards for wastewater treatment units for the treatment of hazardous waste.	Any water generated during operation of the pump and treat system or during extraction/monitoring well drilling or maintenance that meets hazardous waste standards will be treated to meet pretreatment standards, if the water is to be discharged to a Publically Owned Treatment Works (POTW).
Massachusetts Hazardous Waste Rules - Groundwater Protection	310 C.M.R. 30.660	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater.	Any hazardous waste generated by the remedial alternative will be managed to prevent contaminant migration to groundwater.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Hazardous Waste Rules - Containers	310 C.M.R. 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 C.M.R. 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Supplemental Requirements for Hazardous Waste Management Facilities	314 C.M.R. 8.03	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any water generated during operation of the pump and treat system or during extraction/monitoring well drilling or maintenance that meets hazardous waste standards will be treated to meet NPDES standards, if the water is to be discharged to surface waters.
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any water generated during operation of the pump and treat system or during extraction/monitoring well drilling or maintenance will be treated to meet discharge standards if discharged to surface waters.
Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers	314 C.M.R. 12.03(6-7),(9); 12.04(3),(6-14);12.05(1),(6).(12-13); 12.06(1-3)	Applicable	Standards for the operation of waste water treatment works.	The water treatment system for the pump and treat system will be operated and maintained in compliance with these standards.
Prohibitions and Standards for Discharges to POTWs	314 C.M.R. 12.08	Applicable	Standards for discharge into a Publicly Owned Treatment Works (POTW).	Any water generated from the pump and treat system and during installation and management of monitoring/extraction wells will be treated to pretreatment standards if the water is to be discharged to a POTW.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 4.00)	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Used to establish monitoring standards for surface waters and sediments, if required for the remedial action.
Massachusetts Drinking Water Regulations	310 C.M.R. 22.00	Relevant and Appropriate	Establishes maximum contaminant levels that apply to public drinking water supplies. Massachusetts Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) are specified for numerous contaminants, including inorganic and organic chemicals. For the most part, the numerical criteria are identical to Federal Safe Drinking Water Act (SDWA) MCLs and MCLGs, although there are several additional chemicals that have criteria.	Standards used as groundwater monitoring standards until groundwater cleanup is achieved.
Massachusetts Ambient Air Quality Standards	310 C.M.R. 6.00	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Remedial activities, including air discharges from the pump and treat system and excavation and management of monitoring/extraction wells, will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded. Dust standards will be complied with during excavation and management of materials at the Site.
Massachusetts Air Pollution Control Regulations	310 C.M.R. 7.00	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	Remedial activities, including air discharges from the pump and treat system and excavation and management of monitoring/extraction wells, will be implemented in accordance with these rules. No air emissions from remedial activities will cause air quality standards to be exceeded.
Massachusetts Contingency Plan, Implementation of Activity and Use Limitations	310 C.M.R. 40.1070(4)	Relevant and Appropriate	Establish standards for institutional controls at CERCLA sites in Massachusetts.	Institutional controls would be established consistent with State standards for enforceable restrictions on contaminated property to prevent human contact with contaminated groundwater until groundwater cleanup standards are achieved.

Table D-9

Action-Specific and TBCs for SWP-Wide Groundwater

Alternative GW-6: Pump and Treat and Institutional Controls

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters	Feb. 1999	To Be Considered	Guidance on controlling toxic pollutant discharges to surface waters	This guidance will be used in the establishment of monitoring standards for surface waters and sediments, if required for the remedial action.
Allowable Sound	Air Quality Control Policy #90-001	To Be Considered	Guidance on sound emissions.	To be used to assess whether any remedial measures exceed State noise guidance levels.
Massachusetts Standard References for Monitoring Wells	WSC–310-91	To Be Considered	Guidance on locating, drilling, installing, sampling and decommissioning monitoring wells.	Monitoring wells will be established, maintained, and decommissioned in accordance with these guidance standards.
Erosion and Sediment Control Guidance		To Be Considered	Guidance on preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

Table D-10
Chemical-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland
Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Guidelines for Carcinogenic Risk Assessment	EPA/630/P-03/001F	To Be Considered	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Excavation and off-site disposal will prevent human contact with wetland soils/sediments that exceed calculated carcinogenic risk-based standards developed using this guidance.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens	EPA/630/R-03/003F	To Be Considered	This provides guidance on assessing risk to children from carcinogens.	Excavation and off-site disposal will prevent human contact with wetland soils/sediments that exceed calculated carcinogenic risk-based standards for children developed using this guidance.
EPA Risk Reference Doses (RfDs)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Excavation and off-site disposal will prevent human contact with wetland soils/sediments that exceed calculated non-carcinogenic risk-based standards developed using this guidance.
Human Health Assessment Cancer Slope Factors (CSFs)		To Be Considered	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Excavation and off-site disposal will prevent human contact with wetland soils/sediments that exceed calculated carcinogenic risk-based standards developed using this guidance.
EPA Carcinogenic Assessment Group Potency Factors		To Be Considered	These factors are used to evaluate an acceptable risk from a carcinogen.	Excavation and off-site disposal will prevent human contact with wetland soils/sediments that exceed calculated carcinogenic risk-based standards developed using this guidance.
Updated Scientific Considerations for Lead in Soil Cleanups	EPA OLEM Directive 9200.2-167	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil. Used to develop site-specific risk-based standards. Recommends evaluating potential risks from exposures to lead at a Superfund site at a target blood lead level lower than 10 µg/dL.	Excavation and off-site disposal will prevent human contact with lead-contaminated wetland soils/sediments that exceed calculated risk-based standards developed using this guidance.

Table D-10

Chemical-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil	EPA-540-R-03-001 (January 2003)	To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	Excavation and off-site disposal will prevent human contact with lead-contaminated wetland soils/sediments that exceed calculated risk-based standards developed using this guidance.
Guidance on Remedial Actions for Superfund Sites with PCB Contamination	EPA-540-G-90-007 (August 1990)	To Be Considered	EPA Guidance for evaluating risks posed by PCBs at Superfund sites. Used to develop risk-based cleanup standards.	Excavation and off-site disposal will prevent human and ecological contact with PCB-contaminated wetland soils/sediments that exceed risk-based standards developed based on this guidance.
Ontario Ministry of Environment and Energy (OMEE) Lowest Effect Levels (LELs) for Freshwater Sediments	(Persaud *et al*., 1993)	To Be Considered	The SEL value is the concentration at which the majority of the sediment-dwelling organisms are not affected. Used to develop risk-based cleanup standards.	Excavation and off-site disposal will prevent ecological contact with wetland soils/sediments that exceed calculated ecological risk-based standards developed using this guidance.
Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Probable Effects Concentrations (PECs)	(MacDonald *et al*., 2000)	To Be Considered	The PEC value is the concentration above which the adverse effects on sediment-dwelling organisms are likely to occur. Used to develop risk-based cleanup standards.	Excavation and off-site disposal will prevent ecological contact with wetland soils/sediments that exceed calculated ecological risk-based standards developed using this guidance.

Table D-11

Location-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Floodplain Management and Protection of Wetlands	44 C.F.R. 9	Relevant and Appropriate	FEMA regulations that set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands). Prohibits activities that adversely affect a federally-regulated wetland unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. Requires the avoidance of impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain and to avoid development within floodplain wherever there is a practicable alternative. An assessment of impacts to 500-year floodplain is required for critical actions – which includes siting waste facilities in a floodplain. Requires public notice when proposing any action in or affecting floodplain or wetlands.	Federal jurisdictional wetlands altered by wetland soil/sediment excavation/ management and excavation dewatering will be restored in place. The wetland will be backfilled to its original grade. All remedial work within the regulated 500-year floodplain will result in no significant net loss of flood storage capacity and no significant net increase in flood stage or velocities. Floodplain habitat will be restored, to the extent practicable. Public comment was solicited as part of the Proposed Plan concerning the proposed alteration to wetlands and floodplain and comments concerning the wetland excavation component to the remedy were addressed in the Responsiveness Summary (Part 3).
Clean Water Act §404, and regulations	33 U.S.C. 1344, 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323	Applicable	For discharge of dredged or fill material into water bodies or wetlands, there must be no practical alternative with less adverse impact on aquatic ecosystem; discharge cannot cause or contribute to violation of state water quality standard or toxic effluent standard or jeopardize threatened or endangered (T&E) species; discharge cannot significantly degrade waters of U.S.; must take practicable steps to minimize and mitigate adverse impacts; must evaluate impacts on flood level, flood velocity, and flood storage capacity. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources. EPA must determine which alternative is the "Least Environmentally Damaging Practicable Alternative" (LEDPA) to protect wetland and aquatic resources.	Under this alternative dredging/excavation of the wetland soil/sediment and its management on-site, will impact federal jurisdictional wetlands. Activities effecting wetlands will be conducted in accordance with these requirements including, but not limited to, mitigation and/or restoration in place. The wetland will be backfilled to its original grade. EPA has determined this alternative is the LEDPA because (a) there is no practical alternative method that will achieve cleanup objectives with less adverse impact and (b) all practical measures would be taken to minimize and mitigate any adverse impacts from the work. Public comment was solicited on EPA's LEDPA finding in the Proposed Plan and comments concerning the wetland excavation component to the remedy were addressed in the Responsiveness Summary (Part 3).

Table D-11

Location-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Resource Conservation and Recovery Act (RCRA) Floodplain Restrictions for Hazardous Waste Facilities	42 U.S.C. §§ 6901 *et seq.*; 40 C.F.R. § 264.18(b)	Applicable	A hazardous waste treatment, storage, or disposal facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or to result in no adverse effects on human health or the environment if washout were to occur.	Any hazardous waste generated from the excavation and water treatment activities will be managed so that it will not impact floodplain resources.
RCRA Floodplain Restrictions for Solid Waste Disposal Facilities and Practices	40 C.F.R. § 257.3-1	Applicable	Solid waste practices must not restrict the flow of a 100-year flood, reduce the temporary water storage capacity of the floodplain or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.	Any solid waste generated from the excavation and water treatment activities will be managed so that it will not impact floodplain resources.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 662, 663	Applicable	Requires consultation with appropriate agencies to protect fish and wildlife when federal actions may alter waterways. Must develop measures to prevent and mitigate potential loss to the maximum extent possible.	Consultation with appropriate federal agencies will be maintained during planning and implementation of the alternative since it will alter protected resource areas.
National Historical Preservation Act,	16 U.S.C. 469 *et seq.*; 36 C.F.R. Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the Act will be met.	Any undisturbed areas altered by the sediment excavation or management activities will be assessed to ensure no protected resource areas are present. If present there will be consultation with federal and state preservation officials to address measures to avoid, minimize and/or mitigate any impacts to protected resource areas.

Table D-11

Location-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
U.S. Army Corps of Engineers, New England District Compensatory Mitigation Guidance (09-07-2016)		To Be Considered	This Guidance is to be considered when compensatory mitigation to address impacts to federal jurisdictional wetlands is appropriate for a particular remedial activity.	Under this alternative dredging/excavation of the wetland soil/sediment and its management on-site, will impact federal jurisdictional wetlands. Activities effecting federal jurisdictional wetlands will be conducted in accordance with these guidance standards for mitigation and/or restoration.
State Standards				
Massachusetts Wetlands Protection Act and Regulations	MGL c. 131 § 40, 310 C.M.R. 10.00	Applicable	Regulations restrict dredging, filling, altering, or polluting inland wetland resource areas and impose performance standards for work in such areas (including 10.05(6)(k) (stormwater management). Protected resource areas include: 10.54 (Bank); 10.55 (Bordering Vegetated Wetlands); 10.56 (Land under Water); 10.57 (Bordering Land subject to Flooding); and 10.58 (Riverfront Area).	State jurisdictional wetland resource areas altered by wetland soil/sediment excavation/management and excavation dewatering will be restored in place. The wetland will be backfilled to its original grade. All remedial action conducted within 100 feet of a state wetland and 200 feet from a perennial stream will comply with these regulations. There will be no loss of flood storage capacity within Bordering Land Subject to Flooding since the excavation will be backfilled to the original grade of the wetland. Mitigation of impacts on State wetland resource areas will be addressed.
Massachusetts Hazardous Waste Regulations, Location Standards for Land Subject to Flooding	310 C.M.R. 30.701	Applicable	Any new or expanding hazardous waste storage or treatment facility (which only receives hazardous waste from on-site sources), the active portion of which is located within the boundary of land subject to flooding from the statistical 100-year frequency storm, shall be floodproofed. Floodproofing shall be designed, constructed, operated and maintained to prevent floodwaters from coming into contact with hazardous waste.	Any hazardous waste generated from the excavation and water treatment activities will be managed so that it will not impact floodplain resources.

Table D-11

Location-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Clean Water Act; Water Quality Certification for Discharge of Dredged or Fill Material	M.G.L. ch.21, §§ 26-53; 314 C.M.R. §9.00	Applicable	Regulates discharges of dredged or fill material to protect aquatic ecosystems.	Under this alternative dredging/filling of wetlands during wetland soil/sediment excavation/ management and backfilling will be conducted so as to not impair surface water quality.
Antiquities Act and Regulations	M.G.L. ch. 9, §§26-27; 950 C.M.R. 71.00	Relevant and Appropriate	Projects which are state-funded or state-licensed or which are on state property must eliminate, limit, or mitigate adverse effects to properties listed in the register of historic places. Establishes coordination with the National Historic Preservation Act.	Any undisturbed areas altered by the wetland soil/sediment excavation or management activities will be assessed to ensure no protected resource areas are present. If present there will be consultation with federal and state preservation officials to address measures to avoid, minimize and/or mitigate any impacts to protected resource areas.

D-12

Action-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Standards				
Resource Conservation and Recovery Act (RCRA) Subtitle C; Hazardous Waste Identification and Listing Regulations; Generator and Handler Requirements, Closure and Post-Closure	42 U.S.C. §6901 *et seq.*; 40 C.F.R. Parts 260-262 and 264	Relevant and Appropriate for undisturbed hazardous waste; Applicable for any new hazardous waste management	Federal standards used to identify, manage, and dispose of hazardous waste. Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations. These provisions have been adopted by the State. Federal financial assurance requirements are defined at 40 C.F.R. 264.143.	Any wastes generated by wetland soil/sediment excavation and water treatment will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste. Excavation of any hazardous waste present will need to meet closure/post closure standards, including financial assurance requirements.
Toxic Substances Control Act (TSCA); PCB Remediation Waste	15 U.S.C. 2601 *et seq.;* 40 C.F.R. 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	The Record of Decision contains a finding by EPA (Appendix E) that the complete excavation and off-site disposal of all PCB-contaminated wetland soil/sediment above human health and ecological risk levels and treatment of water generated from the excavation/dewatering of excavated soil/sediment will prevent an unreasonable risk to human health or the environment as long as required protective conditions in the determination are met. All PCB-contaminated wetland soil/sediment exceeding human health risk standards or ecological risk standards will be excavated and disposed of off-site at a licensed facility. Any water generated from the remedial action that exceeds EPA risk standards will be treated to meet protective PCB discharge limits. Remedial measures will be based on *in-situ* PCB concentrations in sediment.

D-12

Action-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Clean Water Act, National Recommended Water Quality Criteria	33 U.S.C. § 1314, 40 CFR Part 131	Relevant and Appropriate	NRWQC are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Used to establish monitoring standards for surface waters and sediments to assess the protectiveness of the excavation and sediment management remedial actions.
Clean Water Act; National Pollutant Discharge Elimination System (NPDES)	40 C.F.R. Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any discharges from wetland soil/sediment excavation/management and excavation dewatering will be treated to meet these standards before discharge to surface waters. Stormwater standard will be met if there is over one acre of work.
Clean Water Act; Toxic Pollutant Effluent Standards	40 CFR 129	Applicable	Regulates surface water discharges of specific toxic pollutants, specifically certain pesticides and PCBs.	Any discharges from wetland soil/sediment excavation/management and excavation dewatering will be treated to meet these standards before discharge to surface waters.
Clean Air Act (CAA), Hazardous Air Pollutants; National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42.U.S.C. § 112(b)(1); 40 C.F.R. Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	Emission standards, including for dust, will be achieved during sediment excavation/ management and water treatment.
Generation of investigation derived waste.	OSWER 9345.3-03 FS (1992)	To Be Considered	Guidance on the management of Investigation-Derived Waste (IDW) in a manner that ensures protection of human health and the environment.	IDW generated as part of this remedial alternative will be managed based on guidance standards.
Contaminated Sediment Remediation Guidance for Hazardous Waste Sites	EPA-540-R-05-012 OSWER 9355.0-85 (December 2005)	To Be Considered	Guidance for making remedy decisions for contaminated sediment sites. Some of the relevant sections of the guidance address Remedial Investigations (Ch. 2), FS Considerations (Ch. 3), Monitored Natural Recovery (Ch. 4), *In-Situ* Capping (Ch. 5), and Dredging and Excavation (Ch. 6).	Sediment remediation standards called for in this guidance pertaining to dredging/excavation will be achieved.

D-12

Action-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Remediating Contaminated Sediment Sites - Clarification of Several Key Remedial Investigation/ Feasibility Study and Risk Management Recommendations, and Updated Contaminated Sediment Technical Advisory Group Operating Procedures	OLEM Directive 9200.1-130 (January 2017)	To Be Considered	This guidance identifies eleven recommendations based on current best practices for characterizing sediment sites, evaluating remedial alternatives, and selecting and implementing appropriate response actions.	Sediment remediation standards called for in this guidance pertaining to excavation remedies will be achieved.
State Standards				
Massachusetts Hazardous Waste Rules for Identification and Listing of Hazardous Wastes	310 C.M.R. 30.100	Relevant and Appropriate for undisturbed hazardous waste; Applicable for any new hazardous waste management	Massachusetts is delegated to administer RCRA through its State regulations. These regulations establish requirements for determining whether wastes are either listed or characteristic hazardous waste.	Any wastes generated by wetland soil/sediment excavation and water treatment will be analyzed under these standards to determine whether they are listed or characteristic hazardous waste.
Massachusetts Hazardous Waste Management Rules - Requirements for Generators	310 C.M.R. 30.300	Applicable	These regulations contain requirements for generators of hazardous waste. The regulations apply to generators of sampling waste and also apply to the accumulation of waste prior to off-site disposal.	If any remedial activity generates hazardous wastes, the waste will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Management Rules - General standards for hazardous waste facilities	310 C.M.R. 30.500	Relevant and Appropriate for non-listed waste left in place; Applicable for listed wastes that still display hazardous characteristics or for hazardous wastes generated as part of a cleanup (e.g., excavated soil/sediment)	General facility requirements for waste analysis, security measures, inspections, and training requirements. Section 30.580 addresses closure and Section 30.590 post-closure of hazardous waste facilities.	If hazardous waste is managed prior of off-site disposal these facility standards will be met.

D-12

Action-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Hazardous Waste Rules, Groundwater protection	310 C.M.R. 30.660	Relevant and Appropriate	Hazardous waste facility standards for the protection of groundwater.	If hazardous waste is managed prior to off-site disposal the remedial action must prevent migration of contaminants into groundwater.
Massachusetts Hazardous Waste Rules - Containers	310 C.M.R. 30.680	Applicable	Establishes requirements for the management of containers, such as drums, that would hold field-generated hazardous wastes.	If any remedial activity generates hazardous wastes that will be stored in containers, the containers will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Hazardous Waste Rules - Management, Storage, and Treatment in Tanks	310 C.M.R. 30.690	Applicable	These standards specify requirements for tank systems used to store or treat hazardous waste. Provides specifications for design and installation of tank systems. Requires secondary containment, leak detection systems, and inspections. Identifies general operating requirements, and closure and post-closure care.	If any remedial activity generates hazardous wastes that will be stored in tanks, the tanks will be managed in accordance with the substantive requirements of these regulations.
Massachusetts Clean Water Act; Surface Water Discharge Permit Regulations	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 3.00	Applicable	These regulations provide that discharges to waters of the Commonwealth shall not result in exceedances of MA Surface Water Quality Standards (MSWQS).	Any discharges from wetland soil/sediment excavation/ management and excavation dewatering will be treated to meet these standards before discharge to surface waters. Stormwater standard will be met if there is over one acre of work.
Massachusetts Clean Water Act; MA Surface Water Quality Standards (MSWQS)	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 4.00)	Relevant and Appropriate	These standards designate the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained, or protected. Minimum water quality criteria required to sustain the designated uses are established.	Used to establish monitoring standards for surface waters and sediments to assess the protectiveness of the excavation and sediment management remedial actions.
Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Dischargers	314 C.M.R. 12.03(6-7),(9); 12.04(3),(6-14);12.05(1),(6).(12-13); 12.06(1-3)	Applicable	Standards for the operation of waste water treatment works.	The water treatment system for the water treatment system will be operated and maintained in compliance with these standards.

D-12

Action-Specific ARARs and TBCs for Sediment/Soil at the Murphy Wetland

Alternative WTL5: Deep (3 feet) Excavation and Off-site Disposal, Backfill and Wetland Restoration

Wells G&H Superfund Site, Southwest Properties, Operable Unit Four (OU4)

Requirement	Citation	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Massachusetts Clean Water Act; Supplemental Requirements for Hazardous Waste Management Facilities	M.G.L. ch 21, §§ 26-53; 314 C.M.R. 8.03	Relevant and Appropriate	This regulation outlines the additional requirements that must be satisfied in order for a RCRA facility to comply with the NPDES regulation.	Any discharges from wetland soil/sediment excavation/ management and excavation dewatering will be treated to meet these standards before discharge to surface waters.
Massachusetts Ambient Air Quality Standards	310 C.M.R. 6.00	Applicable	Sets primary and secondary standards for emissions of certain contaminants, including particulate matter.	Emission standards, including for dust, will be achieved during sediment excavation/ management and water treatment..
Massachusetts Air Pollution Control Regulations	310 C.M.R. 7.00	Applicable	These regulations set emission limits necessary to attain ambient air quality standards.	Emission standards, including for dust, will be achieved during sediment excavation/ management and water treatment..
Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters	Feb. 1999	To Be Considered	Guidance on controlling toxic pollutant discharges to surface waters	This guidance will be used in the establishment of monitoring standards for surface waters and sediments, if required for the remedial action.
Allowable Sound	Air Quality Control Policy #90-001	To Be Considered	Guidance on sound emissions.	To be used to assess whether any remedial measures exceed State noise guidance levels.
Erosion and Sediment Control Guidance		To Be Considered	Guidance on preventing erosion and sedimentation.	Remedial actions will be managed to control erosion and sedimentation.

Appendix E: TSCA Determination

TSCA 40 CFR SECTION 761.61(c) RISK-BASED DISPOSAL APPROVAL DETERMINATION

This Determination is included in EPA's Record of Decision ("ROD") to address cleanup of soil and wetland sediment/soil contamination at the Southwest Properties ("SWP") Operable Unit 4 ("OU4") of the Wells G&H Superfund Site in Woburn, Massachusetts. EPA has determined that PCB-contaminated upland soils, wetland sediments/soils, and non-aqueous phase liquid ("NAPL") at concentrations of 1 part per million ("ppm") or greater total PCBs meet the definition of a PCB remediation waste as defined under 40 CFR § 761.3. Therefore, these PCB-contaminated soils, wetland sediments/soils, and NAPL are regulated for cleanup and disposal under 40 CFR Part 761. Under 40 CFR Section 761.61(c), EPA may authorize disposal of PCBs in a manner not otherwise specified provided EPA determines that the disposal will not pose an unreasonable risk of injury to health or the environment.

PCBs present on SWP OU4 will be addressed as follows:

- Upland soils in the designated "Murphy Waste Oil" and "Whitney Barrel" parcels with greater than or equal to ("≥") 50 ppm PCBs will be excavated and disposed off-site as part of an over-all excavation/capping remedy for upland soils. Any remaining upland soils with less than ("<") 50 ppm PCBs and equal to or greater than a recreational risk-based level of 5.3 ppm PCBs on OU4 will be capped with an impermeable cap. That area, and any remaining PCB-contaminated upland soil exceeding 1 ppm PCBs will be subject to institutional controls restricting residential, school, or daycare use consistent with TSCA.

- As part of an excavation/off-site disposal component of the remedy for wetlands (designated as the "Murphy Wetlands"), PCB-contaminated wetland soil with ≥ 1.3 ppm PCBs and PCB contaminated wetland sediment with ≥ 1.9 ppm PCBs, will also be excavated and disposed off-site, as necessary, to meet EPA human health and ecological risk-based cleanup standards.

- As part of a NAPL excavation/off-site disposal component of the remedy, any PCB-contaminated NAPL/soil identified through *in situ* testing will be excavated and disposed of at an off-site disposal facility licensed to accept the PCB-contaminated waste.

- As part of a pump and treat remedy for OU4 groundwater, water will be treated to meet the TSCA PCB surface water discharge level of 0.5 parts per billion ("ppb") PCBs, prior to discharge to the Aberjona River or appropriate approved publicly-owned treatment works (POTW), or disposal at an appropriate off-site permitted disposal facility. Filters or other media generated from the treatment process will be disposed of at an off-site disposal facility licensed to accept the PCB-contaminated waste.

The proposed PCB cleanup standards are based on EPA human health and ecological risk assessments that have determined that soil and wetland soil/sediment below these levels will not pose an unreasonable risk to health or the environment. EPA's Administrative Record, available for public review, includes information on the nature of the contamination, location and extent of the contamination, the procedures used relative to sampling, Human Health and Ecological Risk Assessments, and the Proposed Plan for the SWP OU4.

Consistent with 40 CFR Section 761.61(c) of the Toxic Substances Control Act ("TSCA"), I have determined that the implementation of the remedial components of the OU4 cleanup that includes: a) excavation and off-site disposal of upland soils ≥ 50 ppm PCBs, wetland soils ≥ 1.3 ppm PCBs, wetland sediments ≥ 1.9 ppm PCBs, and PCB-contaminated NAPL; b) disposal under an impermeable cap of PCB-contaminated upland soil between 5.3 and < 50 ppm PCBs; c) institutional controls to restrict residential, school, or daycare use for upland soils greater than 1 ppm PCBs; and d) treatment of groundwater to meet the TSCA PCB discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at permitted facility, or appropriate approved POTW; and off-site disposal of PCB- contaminated treatment residuals, as described, will not pose an unreasonable risk of injury to health or the environment as long as the following conditions are met:

1. The selected contractor for the PCB remediation work shall submit a contractor work plan describing the containment and air monitoring that will be employed during PCB remedial activities, including but not limited to site control, excavation, handling, storage, and disposal activities. This work plan should also include information on how and where all PCB remediation waste will be accumulated/stored prior to off-site shipment/disposal and how the PCB remediation waste will be disposed of; how storm water controls and runoff will be managed; how dust levels will be controlled and monitored; and how field equipment will be decontaminated.

2. Soil in the "Northern Whitney Soil Area" contains soils with concentrations of PCB higher than other areas (by 10 to 100 times) attributable to the former drum storage and washing operations area and former floor drain line on both the Whitney Property and Aberjona Property. Excavation of soils in the Northern Whitney Soil Area will include all soils with total PCBs ≥ 50 parts per million (ppm) and soils with residual Non-Aqueous Phase Liquid (NAPL). Excavation is assumed to include excavation of soils below the water table. Water removed from the excavations will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. In areas where soil with total PCBs ≥ 50 ppm extend into the water table, the saturated soils will be excavated to approximately 15 feet in depth. Excavated soils will be moved to a stockpile area for dewatering and stabilization to facilitate transport to the disposal facility. Any free water generated from the dewatering process will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil, as necessary for off-site disposal. Prior to off-site disposal, the soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils into trucks for off-site disposal is also possible if the soil has been pre-characterized and is sufficiently dry. The area will be backfilled and compacted to pre-excavation elevations using clean fill and an amendment mixed into soil below the water table to reduce/destroy VOC contamination in soil which will also result in reduction of PCB mobility. All PCB-contaminated soils with ≥ 50 ppm will be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). Confirmatory sampling will be conducted in accordance with 40 CFR Part 761, Subpart O to document that all PCBs with ≥ 50 ppm have been removed and to support that PCB concentrations are < 50 ppm for off-site disposal if additional soil removal is required.

3. NAPL-related PCB impacts at two other locations on the Murphy Property contain significantly impacted soils (e.g., total PCBs ≥ 50 ppm) from former waste oil management operations. The excavations will proceed approximately 5 to 6 feet into the water table to a total depth of approximately 12 feet below grade. Sidewall excavation delineation from pre-design and post-excavation bottom samples will be collected and tested to confirm that the NAPL is completely removed, to the extent practicable. Water removed from the excavations will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. A survey will be conducted to document the final excavation depth and in each area sampling will be conducted per 40 CFR Part 761, Subpart O to document that all soils with PCBs ≥ 50 ppm have been removed. Excavated soils will be moved to a stockpile area for dewatering and stabilization, if necessary, to facilitate transport to the disposal

facility. Any free water generated from the dewatering process will be tested and treated if necessary to meet TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil/NAPL, as necessary for off-site disposal. Prior to off-site disposal, the soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils into trucks for off-site disposal is also possible if the soil has been pre-characterized (via *in situ* sampling) and is sufficiently dry. The area will be backfilled and compacted to pre-excavation elevations using clean fill and an amendment mixed in to soil below the water table. These NAPL-related PCB-contaminated soils at the Murphy property with ≥ 50 ppm shall be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*).

4. Remaining PCB remediation waste in upland soils at the SWP that exceed proposed risk-based cleanup levels will be under a protective cap consisting of a uniform placement of concrete, engineered asphalt/bituminous concrete, engineered impermeable cap, or similar material of minimum thickness spread over the area where PCB remediation waste has been left in place in order to prevent/minimize human exposure and reduce ecological impacts, to prevent/minimize infiltration of water, and to prevent/minimize erosion per 40 CFR § 761.61(a)(7). Institutional Controls will be used to protect the integrity of the protective caps. PCB-contaminated soils that need to be excavated as part of the cap construction to provide no net flood storage loss will be moved to a stockpile area, dewatered, and stabilized to facilitate transport to a disposal facility. Water removed from the excavations or from soil dewatering will be tested and treated if necessary to meet the TSCA discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil/NAPL, as necessary for off-site disposal. Prior to off-site disposal, the soil stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soils into trucks for off-site disposal is also possible if the soil has been pre-characterized and is sufficiently dry. PCB-contaminated soils shall be disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). Alternatively, PCB-contaminated soils may be disposed at a state-permitted landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*ii*) provided *in situ* (prior to excavation) sampling confirms PCB concentrations are < 50 ppm. Confirmatory sampling will not be required where remaining PCB-contaminated soil will be under the protective cap.

5. All PCB-contaminated upland soils exceeding 1 ppm total PCBs shall be subject to institutional controls restricting residential, school, and daycare use.

6. For the wetland area, the lower of the applicable human health and ecological proposed cleanup levels will be applied for the remedial actions (*i.e.*, 1.9 ppm total PCBs for wetland sediment and 1.3 ppm total PCBs for wetland soil). All wetland sediment/soil with PCB concentrations at or above these proposed cleanup levels will be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). Water removed from the excavations or from soil/sediment dewatering will be tested and treated if necessary to meet the discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Additional amendments, if required, may be added to dewatered soil/NAPL, as necessary for off-site disposal. Prior to off-site disposal, the soil/sediment stockpiles will be covered to prevent storm water impacts. Direct loading of excavated soil/sediment into trucks for off-site disposal is also possible if the soil/sediment has been pre-characterized and is sufficiently dry. Confirmatory sampling will be performed to demonstrate that all wetland sediment/soil with PCB concentrations exceeding the proposed cleanup levels have been excavated. PCB- contaminated soil/sediment shall be disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). Alternatively, PCB- contaminated soil/sediment may be disposed at a state-

permitted landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*ii*) provided *in situ* (prior to excavation) sampling confirms PCB concentrations are < 50 ppm.

7. Groundwater removed from the pump and treatment system will be treated, as required, to meet the TSCA PCB discharge standard of 0.5 ppb PCBs to be discharged to a nearby surface water body (*e.g.*, Aberjona River) or appropriate off-site disposal at a permitted facility, or appropriate approved POTW. Any treatment media contaminated with PCBs will be tested and disposed of at a TSCA-approved disposal facility. Institutional controls shall be used to prevent groundwater use until groundwater cleanup levels for PCBs and all other remedial cleanup levels are achieved.

8. Compliance with the PCB regulations at 40 CFR Part 761 will be maintained during all phases of work involving PCB-contaminated upland soils, wetland sediments/soils, and other contaminated media including but not limited to: 40 CFR Part 761 Subpart C - Marking of PCBs and PCB Items; 40 CFR § 761.65 - Storage for Disposal; 40 CFR § 761.79 - Decontamination Standards and Procedures; and, 40 CFR Part 761 Subpart K - PCB Waste Disposal Records and Reports.

9. A long-term monitoring and maintenance plan shall be developed and implemented for final compliant caps and for groundwater to ensure effectiveness of the caps in eliminating direct contact with and ensuring no migration of PCBs from OU4.

This Determination is based on the information contained in the Administrative Record. In the event that PCBs are identified on the SWP that meet the definition of a PCB remediation waste and that are not addressed under this TSCA Determination, compliance with 40 CFR § 761.61 for cleanup and disposal of these PCBs shall be required.

In the event that new conditions are identified within the SWP area that were not considered in this Determination, EPA reserves its rights under 40 CFR Part 761 to modify this Determination as necessary to ensure that PCBs remaining at the SWP area do not pose an unreasonable risk of injury to health or the environment.

Nancy Barmakian for

Bryan Olson, Director
Office of Site Remediation and Restoration
Region 1

09/29/17
Date

Appendix F: Acronyms and Abbreviations

ROD LIST OF ACRONYMS & ABBREVIATIONS

AOC	Administrative Orders by Consent
AOI	Areas of Interest
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
B&M	Boston and Maine
BAFs	Bioaccumulation Factors
Beatrice	Beatrice Company
BRA	Baseline Risk Assessment
BSAFs	Biota-Sediment Accumulation Factors
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHES	Clean Harbors Environmental Services
COCs	Chemicals of Concern
COECs	Contaminants of Ecological Concern
COPECs	Chemicals of Potential Ecological Concern
COPCs	Chemicals of Potential Concern
CSGWPP	Comprehensive State Groundwater Protection Program
CTE	Central Tendency Exposures
CWA	Clean Water Act
DCE	Dichloroethene
EDI	Estimated Daily Intake
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESD	Explanation of Significant Difference
FEMA	Federal Emergency Management Agency
FIT	Field Investigation Team
FS	Feasibility Study
FYR	Five-Year Review
GW-	Groundwater - Southwest Properties
HEAST	Health Effects Assessment Summary Table
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HVAC	Heating, Ventilating, and Air Conditioning
ICs	Institutional Controls
IEUBK	Integrated Exposure Uptake Biokinetic
I-G	Industrial General
ILCR	Incremental Lifetime Cancer Risk
I-P	Industrial Park
IRA	Immediate Response Action
IRIS	Integrated Risk Information System
ISCO	In Situ Chemical Oxidation
kg	Kilogram
LEDPA	Least Environmentally Damaging Practicable Alternatives

MANHESP	Massachusetts Heritage & Endangered Species Program
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contamination Levels
MCP	Massachusetts Contingency Plan
MDC	Metropolitan District Commission
MM	Management of Migration
MNA	Monitored Natural Attenuation
MNR	Monitored Natural Recovery
MOA	Memorandum of Agreement, or Mode of Action
mg	Milligram
MSGRP	Multiple Source Groundwater Response Plan
MWRA	Massachusetts Water Resources Authority
N-	NAPL
NAPL	Non-Aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSRR	Office of Site Remediatin and Restoration
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
Plan	Proposed Plan
POTW	Publicly Owned Treatment Works
ppb	Parts Per Billion
ppm	Parts Per Million
PPRTV	Provisional Peer Reviewed Toxicity Values
PRG	Preliminary Remediation Goals
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RG	Remediation Goals
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Levels
SA-	Soil – Aberjona Property
SC	Source Control
SDWA	Safe Drinking Water Act
SM-	Soil – Murphy Property
SOW	Statement of Work
SQO	Sample Quantitation Limits

SVOC	Semi-Volatile Organic Compounds
SW-	Soil – Whitney Property
SWP	Southwest Properties
TBC	To be considered
TCE	Trichloroethene
TSDF	Treatment, Storage & Disposal Facility
TRV	Toxicity Reference Values
TSCA	Toxic Substance Control Act
ug	Microgram
VISL	Vapor Intrusion Screening Levels
VOC	Volatile Organic Compounds
WTL-	Wetland Sediments/Soils – Murphy Wetland
ZVI	Zero-Valent Iron

Appendix G: Administrative Record Index and Guidance Documents

Wells G&H
NPL Site Administrative Record File
Record of Decision (ROD)
Operable Unit (OU) 04 – Southwest Properties

Index

ROD Dated: September 2017
Released: October 2017

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record index for the Wells G&H Superfund Site, Woburn, Massachusetts, Operable Unit (OU) 04 – Southwest Properties Record of Decision (ROD), released October 2017. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site. This file replaces the administrative record file for Operable Unit (OU) 04 – Southwest Properties Record of Decision (ROD) Proposed Plan, released July 2017.

This record includes, by reference, the administrative record of the following response actions: OU 01 Record of Decision (ROD), issued September 14, 1989, and the Industri-Plex OU 02/Wells G&H OU3 Record of Decision (ROD), issued January 31, 2006.

Documents listed as bibliographic sources in individual reports might not be listed separately in the index.

The administrative record file is available for review at:

Online: https://semspub.epa.gov/src/collection/01/AR65178

EPA New England
Office of Site Remediation & Restoration
Records and Information Center
5 Post Office Square, Suite 100 (OSRR02-3)
Boston, MA 02109-3912
(by appointment)
617-918-1440 (phone)
617-918-0440 (fax)

Woburn Public Library
45 Pleasant Street
Woburn, MA 01801
781-933-0148 (phone)
http://woburnpubliclibrary.org

Additional information about the site is also available at www.epa.gov/superfund/wellsgh

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Questions about this administrative record file should be directed to the EPA New England site manager, Joe LeMay (617) 918-1323.

File Break: 01.02 - PRELIMINARY ASSESSMENT

485985 **PRELIMINARY SITE ASSESSMENT (PA), MURPHY'S WASTE OIL SERVICE, INC.**

Author: , CLEAN HARBORS ENVIRONMENTAL ENGINEERING CORP
Addressee: , CLEAN HARBORS INC

# of Pages: 47
Doc Date: 01/01/1989
Resource Type: Report
Access Control: Uncontrolled

530334 **ENVIRONMENTAL SITE ASSESSMENT FINAL REPORT - 228 SALEM STREET [INCOMPLETE]**

Author: , 21E INC
Addressee: JOHN J RILEY JR, NONE

# of Pages: 88
Doc Date: 12/26/1990
Resource Type: Report
Access Control: Uncontrolled

530335 **ENVIRONMENTAL SITE ASSESSMENT FINAL REPORT - 228 SALEM STREET**

Author: , 21E INC
Addressee: , MAGGIORE COMPANIES

# of Pages: 107
Doc Date: 08/10/1993
Resource Type: Report
Access Control: Uncontrolled

File Break: **01.03 - SITE INSPECTION/INVESTIGATION**

485980 **SITE INSPECTION (SI) REPORT FOR THE WHITNEY BARREL COMPANY SITE**

# of Pages: 47
Doc Date: 12/16/1980
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY & ENVIRONMENT INC
Addressee: , US EPA REGION 1

485981 **SITE INSPECTION (SI) REPORT FOR ABERJONA AUTO PARTS**

# of Pages: 29
Doc Date: 11/26/1980
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY & ENVIRONMENT INC
Addressee: , US EPA REGION 1

485982 **UPDATE TO SITE INSPECTION (SI) REPORT FOR ABERJONA AUTO PARTS (TRANSMITTAL MEMO ATTACHED)**

# of Pages: 10
Doc Date: 09/19/1985
Resource Type: Report
Access Control: Uncontrolled

Author: LIYANG CHU, NUS CORP
Addressee: DONALD SMITH, US EPA REGION 1

File Break: **01.03 - SITE INSPECTION/INVESTIGATION**

547753 **FINAL SITE INSPECTION (SI) PRIORITIZATION REPORT FOR JOHN J. RILEY**

# of Pages: 33
Doc Date: 09/25/1998
Resource Type: Report
Access Control: Uncontrolled

Author: , ROY F WESTON INC
Addressee: , US EPA REGION 1

File Break: **01.18 - SITE ASSESSMENT SUPPORT DOCUMENTATION**

248054 **FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES, EVALUATION OF THE HYDROGEOLOGY AND GROUNDWATER QUALITY OF EAST AND NORTH WOBURN, MA, VOLUME 3 OF 4, APPENDIX C: WELL DATA- FINAL REPORT**

# of Pages: 187
Doc Date: 06/25/1982
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY AND ENVIRONMENT INC
Addressee: JOHN F HACKLER, US EPA REGION 1 - OFFICE OF UNCONTROLI WASTE SITES

248055 **FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES, EVALUATION OF THE HYDROGEOLOGY AND GROUNDWATER QUALITY OF EAST AND NORTH WOBURN, MA, VOLUME 1 OF 4 - FINAL REPORT [MARGINALIA]**

# of Pages: 81
Doc Date: 06/25/1982
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY & ENVIRONMENT INC
Addressee: JOHN F HACKLER, US EPA REGION 1 - OFFICE OF UNCONTROLI WASTE SITES

File Break: 01.18 - SITE ASSESSMENT SUPPORT DOCUMENTATION

248056 **FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES, EVALUATION OF THE HYDROGEOLOGY AND GROUNDWATER QUALITY OF EAST AND NORTH WOBURN, MA, VOLUME 4 OF 4 - APPENDIX G : ANALYTICAL DATA, FINAL REPORT**

# of Pages: 306
Doc Date: 06/25/1982
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY AND ENVIRONMENT INC
Addressee: JOHN F HACKLER, US EPA REGION 1 - OFFICE OF UNCONTROLI WASTE SITES

248057 **FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES, CHLORINATED SOLVENT CONTAMINATION OF THE GROUNDWATER, FINAL REPORT**

# of Pages: 125
Doc Date: 03/08/1982
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY & ENVIRONMENT INC
Addressee: JOHN F HACKLER, US EPA REGION 1 - OFFICE OF UNCONTROLI WASTE SITES

563826 **FIELD INVESTIGATION OF UNCONTROLLED HAZARDOUS WASTE SITES, EVALUATION OF THE HYDROGEOLOGY AND GROUNDWATER QUALITY OF EAST AND NORTH WOBURN, MASSACHUSETTS - VOLUME 2 OF 4, APPENDICES A, B, D, E AND F**

# of Pages: 142
Doc Date: 06/25/1982
Resource Type: Report
Access Control: Uncontrolled

Author: , ECOLOGY & ENVIRONMENT INC
Addressee: JOHN HACKLER, US EPA REGION 1

File Break: **02.02 - REMOVAL RESPONSE REPORTS**

284065 **CORRECTIVE ACTION INVESTIGATION REPORT, MURPHY'S WASTE OIL SERVICE INC, VOL 1 OF 3**

# of Pages: 122
Doc Date: 04/15/1996
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee:

284066 **CORRECTIVE ACTION INVESTIGATION REPORT, MURPHY'S WASTE OIL SERVICE INC, VOL 2 OF 3**

# of Pages: 842
Doc Date: 04/15/1996
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee:

448681 **GROUNDWATER MONITORING PLAN: VOLUME 1 OF 2 (WITH 04/15/2002 LETTER OF TRANSMITTAL)**

# of Pages: 149
Doc Date: 04/08/2002
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS
Addressee: , MURPHYS WASTE OIL SERVICE INC

File Break: **02.02 - REMOVAL RESPONSE REPORTS**

448682 **GROUNDWATER MONITORING PLAN: VOLUME 2 OF 2**

Author: , CLEAN HARBORS
Addressee: , MURPHYS WASTE OIL SERVICE INC

# of Pages: 825
Doc Date: 04/08/2002
Resource Type: Report
Access Control: Uncontrolled

448684 **CORRECTIVE ACTION INVESTIGATION REPORT PART 2, MURPHY'S WASTE OIL SERVICE INC, VOLUME 1 OF 1**

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC

# of Pages: 338
Doc Date: 03/16/1998
Resource Type: Report
Access Control: Uncontrolled

448685 **CORRECTIVE ACTION INVESTIGATION REPORT, MURPHY'S WASTE OIL SERVICE INC, VOLUME 3 OF 3**

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee:

# of Pages: 307
Doc Date: 04/15/1996
Resource Type: Report
Access Control: Uncontrolled

File Break: **02.02 - REMOVAL RESPONSE REPORTS**

448686 **ADDENDUM TO CORRECTIVE ACTION INVESTIGATION REPORT PART 2, MURPHY'S WASTE OIL SERVICE INC**

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC

Addressee: , MURPHYS WASTE OIL SERVICE INC

# of Pages: 58
Doc Date: 12/11/1998
Resource Type: Report
Access Control: Uncontrolled

448697 **IMMEDIATE RESPONSE ACTION PLAN (IRAP) FOR MURPHY'S OIL WASTE SERVICE, INC (05/08/2009 TRANSMITTAL LETTER ATTACHED)**

Author: , CLEAN HARBOR ENVIRONMENTAL

Addressee: , MURPHYS WASTE OIL SERVICES INC

# of Pages: 67
Doc Date: 11/22/2002
Resource Type: Report
Access Control: Uncontrolled

457913 **IMMEDIATE RESPONSE ACTION STATUS REPORT AND PLAN MODIFICATION FOR MURPHY'S OIL WASTE SERVICE, INC**

Author: , CLEAN HARBOR ENVIRONMENTAL

Addressee: , MURPHYS WASTE OIL SERVICE INC

# of Pages: 199
Doc Date: 08/21/2003
Resource Type: Report
Access Control: Uncontrolled

File Break: **02.02 - REMOVAL RESPONSE REPORTS**

462023 **REMOVAL PROGRAM PRELIMINARY ASSESSMENT/SITE INVESTIGATION (PA/SI) REPORT FOR THE JOHN J. RILEY SITE, WOBURN MA**

# of Pages: 47
Doc Date: 02/01/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1 EMERGENCY PLANNING AND RESPONSE BRANCH
Addressee:

485989 **REMOVAL PROGRAM PRELIMINARY ASSESSMENT/SITE INVESTIGATION (PA/SI) REPORT FOR THE MURPHY PROPERTY (263 SALEM STREET) SITE**

# of Pages: 74
Doc Date: 11/01/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , WESTON SOLUTIONS INC
Addressee: , US EPA REGION 1

599277 **IMMEDIATE RESPONSE ACTION (IRA) STATUS REPORT, MURPHY'S WASTE OIL SERVICE, INC., 252 SALEM STREET**

# of Pages: 32
Doc Date: 01/29/2016
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC

File Break: **02.02 - REMOVAL RESPONSE REPORTS**

599279 **IMMEDIATE RESPONSE ACTION (IRA) STATUS REPORT, MURPHY'S WASTE OIL SERVICE, INC., 252 SALEM STREET**

# of Pages: 31
Doc Date: 01/17/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC

599280 **IMMEDIATE RESPONSE ACTION (IRA) STATUS REPORT, MURPHY'S WASTE OIL SERVICE, INC., 252 SALEM STREET (TRANSMITTAL LETTER ATTACHED)**

# of Pages: 32
Doc Date: 01/21/2014
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC

599283 **IMMEDIATE RESPONSE ACTION (IRA) STATUS REPORT, MURPHY'S WASTE OIL SERVICE, INC., 252 SALEM STREET**

# of Pages: 29
Doc Date: 07/13/2015
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC

File Break: 02.03 - SAMPLING & ANALYSIS DATA (REMOVAL RESPONSE)

455166 **ADDENDUM 1 TO HYDROGEOLOGIC CHARACTERIZATION REPORT, VOL 1 OF 2 (INCLUDES TRANSMITTAL LETTER)**

# of Pages: 89
Doc Date: 01/31/1995
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICES INC

455167 **ADDENDUM 1 TO HYDROGEOLOGIC CHARACTERIZATION REPORT, VOL 2 OF 2**

# of Pages: 277
Doc Date: 01/31/1995
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICES INC

455168 **HYDROGEOLOGIC CHARACTERIZATION REPORT, VOL 1 OF 2**

# of Pages: 57
Doc Date: 02/01/1994
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICES INC

File Break: 02.03 - SAMPLING & ANALYSIS DATA (REMOVAL RESPONSE)

455169 **HYDROGEOLOGIC CHARACTERIZATION REPORT, VOL 2 OF 2 [MARGINALIA]**

# of Pages: 398
Doc Date: 02/01/1994
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICES INC

File Break: 02.04 - POLLUTION REPORTS (POLREPS)

549963 **POLLUTION REPORT (POLREP) NO. 3, FINAL - JOHN J. RILEY SITE - MOBILIZATION DATE 08/01/2006**

# of Pages: 2
Doc Date: 11/15/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

File Break: 02.09 - ACTION MEMORANDA

463008 **REQUEST FOR A REMOVAL ACTION AT THE JOHN J RILEY SITE, WOBURN, MIDDLESEX COUNTY, MASSACHUSETTS**

# of Pages: 9
Doc Date: 06/15/2006
Resource Type: Memorandum
Access Control: Uncontrolled

Author: FRANK GARDNER, US EPA REGION 1
Addressee: SUSAN STUDLIEN, US EPA REGION 1

File Break: **03.01 - CORRESPONDENCE (RI)**

485988 **LETTER REGARDING REFERRAL OF MURPHY'S WASTE OIL SERVICE FROM RCRA TO CERCLA**

# of Pages: 2
Doc Date: 08/23/2004
Resource Type: Letter
Access Control: Uncontrolled

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: WILLIAM CONNORS, CLEAN HARBORS OF BRAINTREE INC

485990 **EXPANDED TRIP REPORT FOR JOHN J. RILEY**

# of Pages: 66
Doc Date: 09/21/2004
Resource Type: Report
Access Control: Uncontrolled

Author: , WESTON SOLUTIONS INC

Addressee: , US EPA REGION 1

587706 **REDACTED RESPONSE TO REQUEST FOR DOCUMENTS REGARDING ABERJONA AUTO PARTS PROPERTY OIL-WATER SEPARATOR AND UNDERGROUND STORAGE TANK (UST) REMOVAL**

# of Pages: 7
Doc Date: 09/03/2009
Resource Type: Letter
Access Control: Uncontrolled

Author: ROBERT HOLLAND, NORTH BILLERICA (MA) RESIDENT

Addressee: JOSEPH LEMAY, US EPA REGION 1

File Break: **03.01 - CORRESPONDENCE (RI)**

596279 **EPA COMMENTS ON FEBRUARY 2015 DRAFT REMEDIAL INVESTIGATION (RI) REPORT BY AECOM**

Author: JOSEPH F LEMAY, US EPA REGION 1
Addressee: PETER S COX, AECOM

# of Pages: 293
Doc Date: 03/09/2016
Resource Type: Report
Access Control: Uncontrolled

596293 **MAP: TAX MAP 37, WOBURN, MA**

Author: , WOBURN (MA) CITY OF
Addressee:

# of Pages: 1
Doc Date: 08/01/2014
Resource Type: Figure/Map/ Drawing
Access Control: Uncontrolled

596294 **MAP: TAX MAP 38, WOBURN, MA**

Author: , WOBURN (MA) CITY OF
Addressee:

# of Pages: 1
Doc Date: 08/01/2014
Resource Type: Figure/Map/ Drawing
Access Control: Uncontrolled

File Break: **03.01 - CORRESPONDENCE (RI)**

622372 **LETTER REGARDING CONSTRUCTION OF SMALL RINK - VAPOR BARRIER, 278-280 SALEM STREET**

# of Pages: 10
Doc Date: 05/09/2008
Resource Type: Letter
Access Control: Uncontrolled

Author: SAMUEL W BUTCHER, GOLDMAN ENVIRONMENTAL CONSULTANTS
Addressee: JOSEPH F LEMAY, US EPA REGION 1

File Break: **03.02 - SAMPLING & ANALYSIS DATA (RI)**

295888 **SITE ASSESSMENT REPORT OF THE FORMER WHITNEY BARREL COMPANY SITE BY GHR ENGINEERING, VOLUMES 1 AND 2**

# of Pages: 353
Doc Date: 12/01/1988
Resource Type: Report
Access Control: Uncontrolled

Author: , GHR ENGINEERING ASSOCIATES INC
Addressee: RUTH WHITNEY, WHITNEY BARREL CO INC

620710 **SAMPLING LOCATIONS AND SAMPLING RESULTS, SOUTHWEST PROPERTIES, 07/31/2013-08/02/2013**

# of Pages: 2
Doc Date: 08/02/2013
Resource Type: Analytical Data Document
Access Control: Uncontrolled

Author: , AECOM
Addressee:

File Break: **03.02 - SAMPLING & ANALYSIS DATA (RI)**

620711 **REVISED WORK PLAN FOR INSTALLATION OF MONITORING WELLS AND MONITORED NATURAL ATTENUATION GROUNDWATER SAMPLING, SOUTHWEST PROPERTIES**

# of Pages: 181
Doc Date: 06/11/2013
Resource Type: Work Plan
Author: PETER S COX, AECOM
Addressee: JOSEPH LEMAY, US EPA REGION 1
Access Control: Uncontrolled

File Break: **03.04 - INTERIM DELIVERABLES (RI)**

446073 **IMMEDIATE RESPONSE ACTION STATUS REPORT, MURPHY'S WASTE OIL SERVICE INC (WITH 02/29/2008 TRANSMITTAL LETTER)**

# of Pages: 31
Doc Date: 02/22/2008
Resource Type: Report
Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICES INC
Access Control: Uncontrolled

446074 **IMMEDIATE RESPONSE ACTION STATUS REPORT, MURPHY'S WASTE OIL SERVICE INC (WITH 01/29/2007 TRANSMITTAL LETTER)**

# of Pages: 51
Doc Date: 12/22/2006
Resource Type: Report
Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC
Access Control: Uncontrolled

File Break: **03.04 - INTERIM DELIVERABLES (RI)**

446075 **IMMEDIATE RESPONSE ACTION STATUS REPORT, MURPHY'S WASTE OIL SERVICE INC**

# of Pages: 47
Doc Date: 06/22/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHYS WASTE OIL SERVICE INC

446076 **IMMEDIATE RESPONSE ACTION STATUS REPORT, MURPHY'S WASTE OIL SERVICE INC (WITH 01/27/005 TRANSMITTAL LETTER)**

# of Pages: 50
Doc Date: 01/21/2005
Resource Type: Report
Access Control: Uncontrolled

Author: , CLEAN HARBORS ENVIRONMENTAL SERVICES INC
Addressee: , MURPHY WASTE OIL SERVICE INC

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

16934 **REVIEW OF EPA REMEDIAL INVESTIGATION (RI) REPORT, PART 1, VOLUME 7: APPENDIX D**

# of Pages: 23
Doc Date: 07/01/1987
Resource Type: Report
Access Control: Uncontrolled

Author: , GEOTRANS INC
Addressee: , W R GRACE & CO

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

65302 **CENTRAL AREA REMEDIAL INVESTIGATION (RI), PHASE 1A REPORT, VOLUME 2: FIGURES**

Author: , GEOTRANS INC

Addressee: DAVID O LEDERER, US EPA REGION 1

# of Pages: 98
Doc Date: 01/01/1994
Resource Type: Report
Access Control: Uncontrolled

65306 **CENTRAL AREA REMEDIAL INVESTIGATION (RI), PHASE 1A REPORT, VOLUME 3: APPENDICES**

Author: , GEOTRANS INC

Addressee: DAVID O LEDERER, US EPA REGION 1

# of Pages: 502
Doc Date: 01/01/1994
Resource Type: Report
Access Control: Uncontrolled

65307 **CENTRAL AREA REMEDIAL INVESTIGATION (RI), PHASE 1A REPORT, VOLUME 4: APPENDIX H**

Author: , GEOTRANS INC

Addressee: DAVID O LEDERER, US EPA REGION 1

# of Pages: 505
Doc Date: 01/01/1994
Resource Type: Report
Access Control: Uncontrolled

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

65309 **CENTRAL AREA REMEDIAL INVESTIGATION (RI), PHASE 1A REPORT, VOLUME 1 (02/18/1994 TRANSMITTAL LETTTER ATTACHED)**

# of Pages: 240
Doc Date: 02/14/1994
Resource Type: Report
Access Control: Uncontrolled

Author: , GEOTRANS INC

Addressee: DAVID O LEDERER, US EPA REGION 1

230914 **GROUNDWATER USE AND VALUE DETERMINATION (06/21/04 TRANSMITTAL LETTER IS ATTACHED)**

# of Pages: 5
Doc Date: 06/01/2004
Resource Type: Report
Access Control: Uncontrolled

Author: , MA DEPT OF ENVIRONMENTAL PROTECTION

Addressee:

259667 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES, VOL. 1 OF 23**

# of Pages: 305
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY

, US EPA REGION 1

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

259668 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 2 OF 23**

# of Pages: 340
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259670 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 4 OF 23**

# of Pages: 1279
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259671 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 5 OF 23**

# of Pages: 1233
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: 03.06 - REMEDIAL INVESTIGATION REPORTS

259672 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 6 OF 23**

# of Pages: 1191
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259673 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 7 OF 23**

# of Pages: 1333
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259674 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 8 OF 23**

# of Pages: 1284
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

259675 **SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT (RI) SOUTHWEST PROPERTIES VOL. 9 OF 23**

# of Pages: 1244
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259676 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 10 OF 23**

# of Pages: 1264
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259677 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 11 OF 23 [BEST AVAILABLE COPY]**

# of Pages: 1327
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

259678 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 12 OF 23**

# of Pages: 1431
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259679 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 13 OF 23 [BEST AVAILABLE COPY]**

# of Pages: 1379
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259680 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 14 OF 23**

# of Pages: 1296
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

259681 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 15 OF 23**

# of Pages: 1251
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259682 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 16 OF 23**

# of Pages: 1270
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259683 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 17 OF 23**

# of Pages: 1267
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: 03.06 - REMEDIAL INVESTIGATION REPORTS

259684 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 18 OF 23**

# of Pages: 1279
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE
Addressee: , BEATRICE COMPANY
, US EPA REGION 1

259685 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 3 OF 23 [PART 2 OF 2]**

# of Pages: 494
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE
Addressee: , BEATRICE COMPANY
, US EPA REGION 1

260703 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES, VOL. 19 OF 23**

# of Pages: 1271
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE
Addressee: , BEATRICE COMPANY
, US EPA REGION 1

WELLS G&H
AR Collection: 65178
Record of Decision (ROD), 09-29-2017
AR Collection Index Report
For External Use

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

260704 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES, VOL. 20 OF 23**

# of Pages: 1393
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

260705 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES, VOL. 21 OF 23**

# of Pages: 1356
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

260706 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES, VOL. 22 OF 23**

# of Pages: 1358
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

260707 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES, VOL. 23 OF 23**

# of Pages: 955
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

455178 **REMEDIAL INVESTIGATION (RI) PHASE 1A REPORT, ATTACHMENT 1, DRAFT RI SOUTHWEST PROPERTIES [MARGINALIA]**

# of Pages: 430
Doc Date: 02/01/1994
Resource Type: Report
Access Control: Uncontrolled

Author: , REMEDIATION TECHNOLOGIES INC

Addressee: , BEATRICE COMPANY

549964 **[REDACTED] SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) REPORT SOUTHWEST PROPERTIES VOL. 3 OF 23 [PART 1 OF 2] [HANDWRITTEN NOTES]**

# of Pages: 820
Doc Date: 08/01/2003
Resource Type: Report
Access Control: Uncontrolled

Author: , RETEC GROUP, THE

Addressee: , BEATRICE COMPANY
, US EPA REGION 1

File Break: **03.06 - REMEDIAL INVESTIGATION REPORTS**

596278 **REMEDIAL INVESTIGATION (RI) REPORT**

# of Pages: 98310
Doc Date: 11/01/2016
Resource Type: Report
Access Control: Uncontrolled

Author: , AECOM TECHNICAL SERVICES INC
, BEATRICE COMPANY

Addressee:

596279 **EPA COMMENTS ON FEBRUARY 2015 DRAFT REMEDIAL INVESTIGATION (RI) REPORT BY AECOM**

# of Pages: 293
Doc Date: 03/09/2016
Resource Type: Report
Access Control: Uncontrolled

Author: JOSEPH F LEMAY, US EPA REGION 1

Addressee: PETER S COX, AECOM

File Break: **03.07 - WORK PLANS & PROGRESS REPORTS (RI)**

474222 **QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR SUPPLEMENTAL REMEDIAL INVESTIGATION (RI)**

# of Pages: 822
Doc Date: 11/09/2010
Resource Type: Work Plan
Access Control: Uncontrolled

Author: , AECOM

Addressee: , BEATRICE COMPANY

File Break: **03.07 - WORK PLANS & PROGRESS REPORTS (RI)**

474223 **SUPPLEMENTAL REMEDIAL INVESTIGATION (RI) WORK PLAN (TABLES AND FIGURES ATTACHED)**

# of Pages: 297
Doc Date: 11/01/2010
Resource Type: Work Plan
Access Control: Uncontrolled

Author: , AECOM
Addressee: , SOUTHWEST PROPERTIES

622371 **SOIL AND GROUNDWATER MANAGEMENT PLAN FOR CONSTRUCTION ACTIVITIES AT 280 SALEM STREET**

# of Pages: 99
Doc Date: 01/01/2006
Resource Type: Work Plan
Access Control: Uncontrolled

Author: , GOLDMAN ENVIRONMENTAL CONSULTANTS
Addressee: , 280 SALEM STREET LLC

File Break: **03.10 - ENDANGERMENT/BASELINE RISK ASSESSMENTS**

70383 **BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SOUTHWEST PROPERTIES, VOLUME 1 OF 4**

# of Pages: 2828
Doc Date: 02/01/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , METCALF & EDDY INC
, TRC ENVIRONMENTAL CORP
Addressee:

File Break: **03.10 - ENDANGERMENT/BASELINE RISK ASSESSMENTS**

244893 **TRANSMITTAL OF REPLACEMENT PAGES FOR MARCH 2004 BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SOUTHWEST PROPERTIES**

# of Pages: 142
Doc Date: 02/09/2006
Resource Type: Correspondence
Access Control: Uncontrolled

Author: JOSEPH F LEMAY, US EPA REGION 1

Addressee:
PETE COX, RETEC GROUP, THE
ROBERT HOLLAND, NONE
JOHN KELLEY, NONE
JEFF LAWSON, PROJECT CONTROL COMPANIES INC.
CHARLES J MCCREERY, CLEAN HARBORS ENVIRONMENTAL SERVICES INC
THOMAS L MCLAUGHLIN, WOBURN (MA) CITY OF - WOBURN C COUNCIL
JOAN MURPHY, NONE
JOHN E III WHITNEY, NONE
RUTH WHITNEY, NONE
, WOBURN (MA) PUBLIC LIBRARY

448675 **EPA COMMENTS ON OPERABLE UNIT (OU) 2 SOUTHWEST PROPERTIES RISK ASSESSMENT (WITH TRANSMITTAL LETTER)**

# of Pages: 35
Doc Date: 05/14/2009
Resource Type: Report
Access Control: Uncontrolled

Author: JOSEPH F LEMAY, US EPA REGION 1

Addressee: PETER S COX, AECOM

File Break: 03.10 - ENDANGERMENT/BASELINE RISK ASSESSMENTS

457951 **BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SOUTHWEST PROPERTIES, VOLUME 2 OF 4: TABLES**

# of Pages: 668
Doc Date: 02/01/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , METCALF & EDDY INC
, TRC ENVIRONMENTAL CORP

Addressee:

457959 **BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SOUTHWEST PROPERTIES, VOLUME 3 OF 4: APPENDIX A THROUGH APPENDIX C.4 [MARGINALIA]**

# of Pages: 438
Doc Date: 02/01/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , METCALF & EDDY INC
, TRC ENVIRONMENTAL CORP

Addressee:

457960 **BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SOUTHWEST PROPERTIES, VOLUME 4 OF 4: APPENDIX C.4 THROUGH APPENDIX D**

# of Pages: 993
Doc Date: 02/01/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , METCALF & EDDY INC
, TRC ENVIRONMENTAL CORP

Addressee:

File Break: **03.10 - ENDANGERMENT/BASELINE RISK ASSESSMENTS**

541095 **BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT, SOUTHWEST PROPERTIES, OPERABLE UNIT (OU) 2, VOLUME 1 THROUGH VOLUME 3**

# of Pages: 1724
Doc Date: 03/01/2014
Resource Type: Report
Author: , TRC ENVIRONMENTAL CORP
Addressee: , US EPA REGION 1
Access Control: Uncontrolled

File Break: **04.01 - CORRESPONDENCE (FS)**

599281 **EPA SOUTHWEST PROPERTIES (SWP) SITE VISITS ON 06/23/2009 AND 07/23/2010, WHITNEY BARREL PROPERTY, 256 SALEM STREET, WATER OBSERVED UNDER RUSTED SOUTHERN PORTION OF WHITNEY BUILDING AND WOODEN FLOOR / FOUNDATION**

# of Pages: 5
Doc Date: 07/23/2010
Resource Type: Photograph
Author: , US EPA REGION 1
Addressee:
Access Control: Uncontrolled

File Break: **04.02 - SAMPLING & ANALYSIS DATA (FS)**

599282 **LETTER REGARDING RESULTS OF COORDINATED MULTI-PARTY PRE-PHASE 1B WORK PLAN GROUNDWATER SAMPLING AND WATER LEVEL MEASUREMENTS, CENTRAL AREA**

# of Pages: 26
Doc Date: 04/20/2012
Resource Type: Letter
Author: JAMES R ASH, GEI CONSULTANTS, INC.
Addressee: JOSEPH LEMAY, US EPA REGION 1
Access Control: Uncontrolled

File Break: **04.06 - FEASIBILITY STUDY REPORTS**

596281 **EPA COMMENTS ON THE 02/2015 DRAFT FEASIBILITY STUDY (FS) BY AECOM**

# of Pages: 430
Doc Date: 03/22/2016
Resource Type: Letter
Access Control: Uncontrolled

Author: JOSEPH F LEMAY, US EPA REGION 1
Addressee: PETER S COX, AECOM

620700 **FEASIBILITY STUDY (FS) REPORT ADDEDNDUM (12/01/2016 AECOM FEASIBILITY STUDY (FS) ATTACHED)**

# of Pages: 1248
Doc Date: 07/01/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

File Break: **04.07 - WORK PLANS & PROGRESS REPORTS (FS)**

599284 **VAPOR INTRUSION ASSESSMENT WORK PLAN, SOUTHWEST PROPERTIES**

# of Pages: 75
Doc Date: 03/01/2013
Resource Type: Work Plan
Access Control: Uncontrolled

Author: , AECOM
Addressee: , SOUTHWEST PROPERTIES

File Break: **04.07 - WORK PLANS & PROGRESS REPORTS (FS)**

599286 **LETTER REGARDING REVISED WORK PLAN FOR INSTALLATION OF MONITORING WELLS AND MONITORED NATURAL ATTENUATION GROUNDWATER SAMPLING, SOUTHWEST PROPERTIES**

# of Pages: 181
Doc Date: 07/01/2013
Resource Type: Letter
Access Control: Uncontrolled

Author: PETER S COX, AECOM
Addressee: JOSEPH LEMAY, US EPA REGION 1

File Break: **04.09 - PROPOSED PLANS FOR SELECTED REMEDIAL ACTION**

599262 **PROPOSED PLAN**

# of Pages: 47
Doc Date: 07/01/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

599270 **DRAFT TSCA DETERMINATION, TSCA 40 CFR SECTION 761.61(C) DRAFT RISK-BASED DISPOSAL APPROVAL DETERMINATION**

# of Pages: 4
Doc Date: 07/14/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

File Break: **05.01 - CORRESPONDENCE (ROD)**

622388 **LETTER REGARDING STATE CONCURRENCE WITH RECORD OF DECISION (ROD), SOUTHWEST PROPERTIES**

Author: PAUL LOCKE, MA DEPT OF ENVIRONMENTAL PROTECTION

Addressee: BRYAN OLSON, US EPA REGION 1

# of Pages: 3
Doc Date: 09/28/2017
Resource Type: Letter
Access Control: Uncontrolled

File Break: **05.03 - RESPONSIVENESS SUMMARIES**

620755 **EMAIL REQUESTING EXTENSION TO COMMENT PERIOD ON PROPOSED PLAN (08/10/2017 EMAIL TRANSMITTAL ATTACHED)**

Author: SAMUEL BUTCHER, LOUREIRO ENGINEERING ASSOCIATES INC

Addressee: JOSEPH F LEMAY, US EPA REGION 1

# of Pages: 0
Doc Date: 08/09/2017
Resource Type: Email
Access Control: Uncontrolled

620767 **PUBLIC COMMENT ON PROPOSED CLEAN UP PLAN FOR THE SOUTH WEST PROPERTIES**

Author: MICHAEL RAYMOND, ABERJONA STUDY COALITION INC

Addressee: JOSEPH LEMAY, US EPA REGION 1

# of Pages: 4
Doc Date: 08/11/2017
Resource Type: Letter
Access Control: Uncontrolled

File Break: **05.03 - RESPONSIVENESS SUMMARIES**

620769 **PUBLIC COMMENT ON PROPOSED PLAN**

# of Pages: 3
Doc Date: 08/11/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: JENNIFER MCWEENEY, MA DEPT OF ENVIRONMENTAL PROTECTION

Addressee: JOSEPH LEMAY, US EPA REGION 1

620783 **PUBLIC COMMENT ON PROPOSED PLAN**

# of Pages: 1
Doc Date: 08/17/2017
Resource Type: Memorandum
Access Control: Uncontrolled

Author: , S&J PROPERTY MANAGEMENT

Addressee: JOSEPH LEMAY, US EPA REGION 1

JENNIFER MCWEENEY, MA DEPT OF ENVIRONMENTAL PROTE

JIM MURPHY, US EPA REGION 1

622330 **PUBLIC COMMENT ON PROPOSED PLAN WITH RESPECT TO REMEDIATION PROGRAM, SOUTHWEST PROPERTIES**

# of Pages: 5
Doc Date: 09/07/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: SAMUEL BUTCHER, LOUREIRO ENGINEERING ASSOCIATES INC

, 280 SALEM STREET LLC

Addressee: JOSEPH LEMAY, US EPA REGION 1

File Break: **05.03 - RESPONSIVENESS SUMMARIES**

622335 **PUBLIC COMMENTS ON THE PROPOSED PLAN FOR THE SOUTHWEST PROPERTIES PORTION OF THE SITE**

# of Pages: 5
Doc Date: 09/12/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , AECOM
, BEATRICE COMPANY

Addressee: , US EPA REGION 1

622387 **RESPONSIVENESS SUMMARY, RECORD OF DECISION (ROD), SOUTHWEST PROPERTIES**

# of Pages: 21
Doc Date: 09/29/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1

Addressee:

File Break: **05.04 - RECORD OF DECISION (ROD)**

16796 **RECORD OF DECISION (ROD)**

# of Pages: 226
Doc Date: 09/14/1989
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1

Addressee:

File Break: 05.04 - RECORD OF DECISION (ROD)

622386 **RECORD OF DECISION (ROD), SOUTHWEST PROPERTIES**

# of Pages: 320
Doc Date: 09/29/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

File Break: 06.06 - WORK PLANS & PROGRESS REPORTS (RD)

599263 **DRAFT BEDROCK INVESTIGATION WORK PLAN, WILDWOOD PROPERTY [MARGINALIA]**

# of Pages: 66
Doc Date: 08/04/1993
Resource Type: Work Plan
Access Control: Uncontrolled

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

File Break: 07.05 - REMEDIAL ACTION DOCUMENTS

553621 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY**

# of Pages: 48
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

File Break: **07.05 - REMEDIAL ACTION DOCUMENTS**

553622 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDICES A-I**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 291
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

553623 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDICES J-U**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 306
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

553624 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDIX 5 CONTRACT LABORATORY PROGRAM (CLP) DATA PACKAGES - VOLUME 1 OF 6**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 357
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

File Break: **07.05 - REMEDIAL ACTION DOCUMENTS**

553625 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDIX 5 CONTRACT LABORATORY PROGRAM (CLP) DATA PACKAGES - VOLUME 2 OF 6**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 379
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

553626 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDIX 5 CONTRACT LABORATORY PROGRAM (CLP) DATA PACKAGES - VOLUME 3 OF 6**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 381
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

553627 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDIX 5 CONTRACT LABORATORY PROGRAM (CLP) DATA PACKAGES - VOLUME 4 OF 6**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 391
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

File Break: 07.05 - REMEDIAL ACTION DOCUMENTS

553628 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDIX 5 CONTRACT LABORATORY PROGRAM (CLP) DATA PACKAGES - VOLUME 5 OF 6**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 395
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

553629 **REMEDIAL ACTION (RA) COMPLETION REPORT - DEBRIS, SLUDGE AND MIXED-CONTAMINANT SOIL REMOVAL - WILDWOOD PROPERTY - APPENDIX 5 CONTRACT LABORATORY PROGRAM (CLP) DATA PACKAGES - VOLUME 6 OF 6**

Author: , REMEDIATION TECHNOLOGIES INC
Addressee: , BEATRICE COMPANY

# of Pages: 562
Doc Date: 03/01/1995
Resource Type: Report
Access Control: Uncontrolled

File Break: 09.01 - CORRESPONDENCE (STATE COORDINATION)

599294 **EMAIL REGARDING DOWNGRADIENT PROPERTY STATUS (DPS) FILINGS**

Author: DAVID M SULLIVAN, TRC ENVIRONMENTAL CORP
Addressee: JOSEPH LEMAY, US EPA REGION 1

# of Pages: 2
Doc Date: 04/01/2016
Resource Type: Email
Access Control: Uncontrolled

WELLS G&H

AR Collection: 65178

Record of Decision (ROD), 09-29-2017

AR Collection Index Report

For External Use

File Break: **09.10 - STATE TECHNICAL AND HISTORICAL RECORDS**

546192 **CLASS 2-A RESPONSE ACTION OUTCOME (RAO) STATEMENT FORMER JOHN J. RILEY TANNERY SITE, RTN 3-25732 - REVISED 04/03/2013 (TRANSMITTAL LETTER ATTACHED)**

# of Pages: 947
Doc Date: 04/03/2013
Resource Type: Report
Access Control: Uncontrolled

Author: , TETRA TECH NUS INC
Addressee: , MA DEPT OF ENVIRONMENTAL PROTECTION

599276 **REPORT OF ACTIVITIES AND SOIL EXCAVATION PLAN, TANNERY WASTE AND SOIL CONTAMINATION, 228 SALEM STREET**

# of Pages: 114
Doc Date: 04/25/1996
Resource Type: Letter
Access Control: Uncontrolled

Author: SANDRA M HEBERT, 21E INC
Addressee: MITRA KHADEM, MA DEPT OF ENVIRONMENTAL PROTECTION

599278 **CLASS 2-A RESPONSE ACTION OUTCOME (RAO) STATEMENT FORMER JOHN J. RILEY TANNERY SITE, RTN 3-25732 (TRANSMITTAL LETTER ATTACHED)**

# of Pages: 219
Doc Date: 01/27/2011
Resource Type: Report
Access Control: Uncontrolled

Author: , TETRA TECH NUS INC
Addressee: , MA DEPT OF ENVIRONMENTAL PROTECTION

File Break: 09.10 - STATE TECHNICAL AND HISTORICAL RECORDS

599292 **RELEASE ABATEMENT MEASURE COMPLETION STATEMENT, ORGANIX LLC (FORMER JOHN J RILEY SITE), 240 SALEM STREET**

# of Pages: 138
Doc Date: 11/14/2006
Resource Type: Report
Access Control: Uncontrolled

Author: , RIZZO ASSOCIATES
Addressee: , MA DEPT OF ENVIRONMENTAL PROTECTION

599293 **PHASE 1 INITIAL SITE INVESTIGATION (SI) AND TIER CLASSIFICATION, ORGANIX LLC (FORMER JOHN J RILEY SITE), 240 SALEM STREET**

# of Pages: 325
Doc Date: 03/13/2007
Resource Type: Report
Access Control: Uncontrolled

Author: , RIZZO ASSOCIATES
Addressee: , MA DEPT OF ENVIRONMENTAL PROTECTION

File Break: 10.03 - STATE AND LOCAL ENFORCEMENT RECORDS

493519 **LETTER REGARDING NOTICE OF NON-COMPLIANCE AND AUDIT FINDINGS COMPLETION STATEMENT, 228 SALEM STREET, WOBURN, MA (FIGURES ATTACHED)**

# of Pages: 14
Doc Date: 08/14/1996
Resource Type: Letter
Access Control: Uncontrolled

Author: SANDRA M HEBERT, 21E INC
HEIDI PORTER, 21E INC
Addressee: MITRA KHADEM, MA DEPT OF ENVIRONMENTAL PROTECTION

File Break: **10.03 - STATE AND LOCAL ENFORCEMENT RECORDS**

493520 **LETTER REGARDING NOTICE OF NON-COMPLIANCE AND AUDIT FINDINGS COMPLETION STATEMENT, 228 SALEM STREET, WOBURN, MA (DATA, FIGURES AND TABLES ATTACHED)**

# of Pages: 44
Doc Date: 08/14/1996
Resource Type: Letter
Access Control: Uncontrolled

Author: SANDRA M HEBERT, 21E INC
HEIDI PORTER, 21E INC

Addressee: MITRA KHADEM, MA DEPT OF ENVIRONMENTAL PROTECTION

493522 **FINAL REPORT, ENVIRONMENTAL SITE ASSESSMENT, 228 SALEM STREET, WOBURN, MA [MARGINALIA]**

# of Pages: 16
Doc Date: 12/26/1990
Resource Type: Report
Access Control: Uncontrolled

Author: , 21E INC

Addressee: JOHN J RILEY JR, NONE

493523 **IMMEDIATE RESPONSE ACTION PLAN (IRAP), 228 SALEM STREET, WOBURN, MA (TRANSMITTAL LETTER ATTACHED)**

# of Pages: 6
Doc Date: 04/12/1996
Resource Type: Report
Access Control: Uncontrolled

Author: , 21E INC

Addressee: , DEPT OF ENVIRONMENTAL PROTECTION

File Break: **10.03 - STATE AND LOCAL ENFORCEMENT RECORDS**

493524 **LETTER REGARDING NOTICE OF AUDITING FINDINGS, 288 SALEM STREET, WOBURN, MA (MAP ATTACHED)**

# of Pages: 6
Doc Date: 01/26/1996
Resource Type: Letter
Access Control: Uncontrolled

Author: SANDRA M HEBERT, 21E INC

Addressee: MITRA KHADEM, MA DEPT OF ENVIRONMENTAL PROTECTION

493528 **21E ASSESSMENT OF J. J. RILEY PROPERTY, 228 SALEM STREET, WOBURN, MA**

# of Pages: 27
Doc Date: 04/19/1985
Resource Type: Report
Access Control: Uncontrolled

Author: , GEOTECHNICAL ENGINEERS INC

Addressee: , NUTTER MCCLENNEN & FISH LLP

493531 **MEMO REGARDING 03/08/1996 MEETING RESULTS**

# of Pages: 2
Doc Date: 03/25/1996
Resource Type: Meeting Document
Access Control: Uncontrolled

Author: MITRA KHADEM, MA DEPT OF ENVIRONMENTAL PROTECTION

Addressee: PATRICIA DONAHUE, MA DEPT OF ENVIRONMENTAL PROTECT

JACK DUGGAN, MA DEPT OF ENVIRONMENTAL QUALITY ENGINEERING

File Break: 10.03 - STATE AND LOCAL ENFORCEMENT RECORDS

493532 **RELEASE NOTIFICATION AND NOTIFICATION OF POTENTIAL RESPONSIBILITY (RELEASE LOG FORMS ATTACHED)**

# of Pages: 5
Doc Date: 02/26/1996
Resource Type: Letter
Author: KINGSLEY NDI, MA DEPT OF ENVIRONMENTAL PROTECTION
Addressee: JOHN RILEY, WEDEL CORP
Access Control: Uncontrolled

555845 **MASSACHUSETTS CONTINGENCY PLAN (MCP) PHASE 2 AND PHASE 3 REPORT FOR THE FORMER JOHN J. RILEY SITE**

# of Pages: 728
Doc Date: 03/15/2009
Resource Type: Report
Author: , TETRA TECH RIZZO
Addressee: , MA DEPT OF ENVIRONMENTAL PROTECTION
Access Control: Uncontrolled

File Break: 10.08 - EPA CONSENT DECREES

16982 **CONSENT DECREE, CIVIL ACTION 91-11807 MA**

# of Pages: 250
Doc Date: 09/28/1990
Resource Type: Legal Instrument
Author: , US EPA REGION 1
Addressee:
Access Control: Uncontrolled

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

457530 **COMFORT/STATUS LETTER - 280 SALEM STREET LLC (INCLUDES WASTELAN FORM)**

# of Pages: 8
Doc Date: 05/07/2004
Resource Type: Letter
Access Control: Uncontrolled

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: ROBERT HOLLAND, 280 SALEM STREET LLC

559966 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - WHITNEY BARREL CO INC,**

# of Pages: 12
Doc Date: 02/16/1988
Resource Type: Letter
Access Control: Uncontrolled

Author: JOHN WHITNEY, WHITNEY BARREL CO INC
RUTH WHITNEY, WHITNEY BARREL CO INC

Addressee: BARBARA NEWMAN, US EPA REGION 1

595616 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - WR GRACE & CO - CONN**

# of Pages: 6
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: SETH D JAFFE, FOLEY HOAG LLP
, WR GRACE & CO - CONN

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595617 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - WILDWOOD CONSERVATION CORP**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: JOHN J RILEY JR, WILDWOOD CONSERVATION CORP
, WILDWOOD CONSERVATION CORP

595618 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - SYLVANIA**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: DAVID M FELDMAN, VERIZON INC
, SYLVANIA

595619 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - VARIAN**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: ROBERT HALLIDAY, VARIAN SEMICONDUCTOR EQUIPMENT ASSOCIATES INC
, VARIAN

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595620 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - VARIAN MEDICAL SYSTEMS**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: DOW WILSON, VARIAN MEDICAL SYSTEMS
, VARIAN

595622 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - UNIFIRST CORP**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: GREGORY A BIBLER, GOODWIN PROCTOR LLP
, UNIFIRST CORP

595623 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - STEPAN CO**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: KEVIN M MCKENNA, LATSHA DAVIS AND MCKENNA
, STEPAN CO

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595624 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - SAMUEL CABOT INC**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: JEFFREY J HAYWARD, VALSPAR CORPORATION THE
, SAMUEL CABOT INC

595625 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - S & J MANAGEMENT INC**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: JJAMES KONAXIS, S & J MANAGEMENT INC
SUSAN M WHITNEY, S & J MANAGEMENT INC
, S & J MANAGEMENT INC

595626 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - OSRAM SYLVANIA INC**

# of Pages: 9
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: CHRISTINE SHEEDY, OSRAM SYLVANIA
, OSRAM SYLVANIA

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595627 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - ORGANIX LLC**

# of Pages: 6
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: BARBARA K LANDAU, NOBLE AND WICKERSHAM LLP
, ORGANIX LLC

595628 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - OLIN CORP**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: CURTIS M RICHARDS, OLIN CORP
, OLIN CORP

595629 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - OLD OIL REALTY TRUST**

# of Pages: 6
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: GEORGE P. LUKER, ATTORNEY AT LAW
JOAN E MURPHY, OLD OIL REALTY TRUST
, OLD OIL REALTY TRUST

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595630 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - NEW ENGLAND PLASTICS CORP**

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: FRANKLIN STEARNS, K&L GATES LLP
, NEW ENGLAND PLASTICS

# of Pages: 6
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

595631 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - MURPHY'S WASTE OIL SERVICES**

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: TIMMERY FITZPATRICK, CLEAN HARBORS
, CLEAN HARBORS ENVIRONMENTAL SERVICES INC
, MURPHY'S WASTE OIL SERVICE INC

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

595632 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - LAMCO CHEMICAL CO**

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: JAMES G LAMM, LAMCO CHEMICAL CO INC

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595633 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - KINGSTON STEEL DRUM**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: ERIC BERRY, MALLINCKRODT US HOLDINGS, LLC
, GREAT LAKES CONTAINER CORP
, KINGSTON STEEL DRUM

595634 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - KEK REALTY TRUST**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: SUSAN M WHITNEY, KEK REALTY TRUST
JOHN E WHITNEY III, KEK REALTY TRUST

595635 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - HONEYWELL INTERNATIONAL**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: DAVID M COTE, HONEYWELL INTERNATIONAL INC

File Break: 11.09 - PRP-SPECIFIC DOCUMENTS

595636 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - GOULSTON TECHNOLOGIES**

# of Pages: 6
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: ETHAN R. WARE, MCNAIR LAW FIRM, P.A.
, GEORGE A GOULSTON
, GOULSTON TECHNOLOGIES INC

595637 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - GILLETTE**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: NATHANIEL S OROSZ, PROCTOR & GAMBLE
, GILLETTE CO

595638 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - CUMMINGS PROPERTIES MANAGEMENT**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: CRAIG ZAIDY, CUMMINGS PROPERTY LLC
, CUMMINGS PROPERTIES MANAGEMENT INC

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595640 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - BOUTWELL MORSE**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee:
MICHAEL BOUTWELL, NONE
ROBERT C BOUTWELL, NONE
WILLIAM BOUTWELL, NONE
GRACE MORSE, NONE
JEFFREY B RENTON, GILBERT & RENTON LLC

595641 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - BOSTON EDISON CO**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee:
JEFFREY N, ESQ STEVENS, EVERSOURCE ENERGY
, BOSTON EDISON CO/NSTAR ELECTRIC AND GAS CO

595642 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - BEATRICE CO**

# of Pages: 5
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee:
JAMES SANDLER, LOWENSTEIN SANDLER LLP
, BEATRICE COMPANY
, CONAGRA FOODS INC

File Break: 11.09 - PRP-SPECIFIC DOCUMENTS

595643 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - BAYERCROPSCIENCE INC**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: LUKE METTE, STAUFFER MANAGEMENT COMPANY
, BAYER CROPSCIENCE INC

595644 **NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - 280 SALEM STREET LLC**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: ROBERT L HOLLAND, HOLLAND ARENA INC
, 280 SALEM STREET LLC

595645 **RETURNED NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - HONEYWELL**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: THOMAS R MAHER, BULL HN INFORMATION SYSTEMS INC
, HONEYWELL

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

595646 **RETURNED NOTIFICATION TO POTENTIALLY INTERESTED PARTY (PIP) OF PROPOSED CLEANUP PLAN - VARIAN INC**

# of Pages: 4
Doc Date: 07/06/2017
Resource Type: Letter
Access Control: Uncontrolled

Author: LYNNE A JENNINGS, US EPA REGION 1

Addressee: DANIEL W PEIXOTO, VARIAN

596283 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - ABERJONA AUTO PARTS**

# of Pages: 20
Doc Date: 01/27/1988
Resource Type: Letter
Access Control: Uncontrolled

Author: CLIFFORD BOUTWELL, ABERJONA AUTO PARTS INC

DENNIS J CURRAN, CURRAN & CAMERON

Addressee: BARBARA NEWMAN, US EPA REGION 1

599271 **ASSESSOR INFORMATION - 250 SALEM STREET, MURPHY PROPERTY**

# of Pages: 3
Doc Date: 02/10/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , VISION GOVERNMENT SOLUTIONS

Addressee:

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

599272 **ASSESSOR INFORMATION - 252 SALEM STREET, MURPHY PROPERTY**

# of Pages: 3
Doc Date: 02/10/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , VISION GOVERNMENT SOLUTIONS
Addressee:

599273 **ASSESSOR INFORMATION - 256 SALEM STREET, WHITNEY PROPERTY**

# of Pages: 4
Doc Date: 02/10/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , VISION GOVERNMENT SOLUTIONS
Addressee:

599274 **ASSESSOR INFORMATION - 270 SALEM STREET, ABERJONA PROPERTY**

# of Pages: 3
Doc Date: 02/10/2017
Resource Type: Report
Access Control: Uncontrolled

Author: , VISION GOVERNMENT SOLUTIONS
Addressee:

File Break: **11.09 - PRP-SPECIFIC DOCUMENTS**

599275 **ASSESSOR INFORMATION - 280 SALEM STREET, ABERJONA PROPERTY**

# of Pages: 3
Doc Date: 02/10/2017
Resource Type: Report
Author: , VISION GOVERNMENT SOLUTIONS
Addressee:
Access Control: Uncontrolled

File Break: **13.03 - NEWS CLIPPINGS/PRESS RELEASES**

620706 **NEWS RELEASE: EPA PROPOSES CLEANUP PLAN FOR THE WELLS G&H SUPERFUND SITE IN WOBURN, MA - PUBLIC COMMENT IS OPEN UNTIL 08/14/2017**

# of Pages: 2
Doc Date: 07/12/2017
Resource Type: Publication
Author: , US EPA REGION 1
Addressee:
Access Control: Uncontrolled

620766 **PUBLIC NOTICE: EPA EXTENDS PUBLIC COMMENT PERIOD FOR THE PROPOSED CLEANUP PLAN FOR THE WELLS G&H SUPERFUND SITE IN WOBURN, MA**

# of Pages: 1
Doc Date: 08/10/2017
Resource Type: Publication
Author: , US EPA REGION 1
Addressee:
Access Control: Uncontrolled

File Break: 13.03 - NEWS CLIPPINGS/PRESS RELEASES

622306 **PRESS RELEASE: EPA EXTENDS PUBLIC COMMENT PERIOD FOR THE PROPOSED CLEANUP PLAN FOR THE WELLS G&H SUPERFUND SITE IN WOBURN, MA**

# of Pages: 1
Doc Date: 08/21/2017
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Author: , US EPA REGION 1
Addressee:

622361 **PUBLIC NOTICE AS PUBLISHED IN BOSTON GLOBE AND WOBURN DAILY TIMES: US EPA ANNOUNCES A 30-DAY EXTENSION TO THE 30-DAY PUBLIC COMMENT PERIOD ON THE PROPOSED CLEANUP PLAN FOR THE WELLS G&H SUPERFUND SITE, WOBURN, MA**

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Doc Date: 08/18/2017
Resource Type: Publication
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Author: , US EPA REGION 1
Addressee:

622362 **PUBLIC NOTICE AS PUBLISHED IN BOSTON GLOBE: US EPA ANNOUNCES A 30-DAY PUBLIC COMMENT PERIOD ON THE PROPOSED CLEANUP PLAN FOR THE WELLS G&H SUPERFUND SITE, WOBURN, MA**

# of Pages: 1
Doc Date: 07/14/2017
Resource Type: Publication
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

File Break: **13.04 - PUBLIC MEETINGS/HEARINGS**

620705 **SAVE THE DATE CARD, PUBLIC MEETING 07/13/2017, PUBLIC HEARING 08/03/2017**

# of Pages: 2
Doc Date: 07/01/2017
Resource Type: Publication
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

620747 **PROPOSED PLAN PUBLIC MEETING PRESENTATION, SOUTHWEST PROPERTIES (SWP)**

# of Pages: 29
Doc Date: 07/13/2017
Resource Type: Meeting Document
Access Control: Uncontrolled

Author: JOSEPH LEMAY, US EPA REGION 1
Addressee:

620753 **PROPOSED PLAN PRESENTATION BEFORE PUBLIC HEARING, SOUTHWEST PROPERTIES (SWP)**

# of Pages: 13
Doc Date: 08/03/2017
Resource Type: Meeting Document
Access Control: Uncontrolled

Author: JOSEPH LEMAY, US EPA REGION 1
Addressee:

File Break: **13.04 - PUBLIC MEETINGS/HEARINGS**

621412 **[REDACTED] PUBLIC MEETING FOR PROPOSED CLEANUP PLAN SIGN-IN SHEET**

# of Pages: 2
Doc Date: 07/13/2017
Resource Type: Meeting Document
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

621414 **[REDACTED] PUBLIC HEARING 08/03/17 SIGN-IN SHEET**

# of Pages: 2
Doc Date: 08/03/2017
Resource Type: Meeting Document
Access Control: Uncontrolled

Author: , US EPA REGION 1
Addressee:

622307 **PUBLIC HEARING TRANSCRIPT**

# of Pages: 12
Doc Date: 08/03/2017
Resource Type: Meeting Document
Access Control: Uncontrolled

Author: JENNIFER DOHERTY, EPPLEY COURT REPORTING LLC
Addressee:

File Break: 17.04 - NON-PRINT MATERIALS

485979 **SANBORN FIRE INSURANCE MAP OF WHITNEY BARREL**

# of Pages: 1
Doc Date: 01/01/1969
Resource Type: Figure/Map/ Drawing
Access Control: Uncontrolled

Author:

Addressee:

File Break: 20.01 - ADMINISTRATIVE RECORD INDEXES

620708 **WELLS G&H OPERABLE UNIT (OU) 4 RECORD OF DECISION (ROD) PROPOSED PLAN ADMINISTRATIVE RECORD (AR) FILE INDEX**

# of Pages: 51
Doc Date: 07/01/2017
Resource Type: Administrative Record Index
Access Control: Uncontrolled

Author: , US EPA REGION 1

Addressee:

Number of Documents in Administrative Record: **184**

Selected Key Guidance Documents

EPA Guidance Documents may be reviewed at the OSRR Records and Information Center in Boston, MA

DOCNUMBER	DOCDATE	TITLE
11-196769	01-Jan-80	Ambient water quality criteria for DDT
11-101118	27-Sep-85	OSWER Directive 9850.3: Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites, Final Report; Compendium 5001
11-128301	01-Oct-88	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, OSWER Directive 9355.3-01
11-191	01-Dec-89	RISK ASSESSMENT GUIDANCE FOR SUPERFUND (RAGS), VOLUME I-HUMAN HEALTH EVALUATION MANUAL, PART A
11-137293	01-Jan-90	The 1990 National Contingency Plan, DRAFT
11-190591	25-Mar-91	RISK ASSESSMENT GUIDANCE FOR SUPERFUND VOLUME I: HUMAN HEALTH EVALUATION MANUAL, SUPPLEMENTAL GUIDANCE: "STANDARD DEFAULT EXPOSURE FACTORS"
11-130917	22-Apr-91	MEMO REGARDING ROLE OF THE BASELINE RISK ASSESSMENT IN SUPERFUND REMEDY SELECTION DECISIONS
11-192	01-Dec-91	RISK ASSESSMENT GUIDANCE FOR SUPERFUND (RAGS), VOLUME I - HUMAN HEALTH EVALUATION MANUAL, PART B:
11-127549	01-May-92	SUPPLEMENTAL GUIDANCE TO RAGS: CALCULATING THE CONCENTRATION TERM
11-190663	01-Dec-93	WILDLIFE EXPOSURE FACTORS HANDBOOK, VOLUME I OF II
11-157100	01-Feb-94	GUIDANCE MANUAL FOR THE INTEGRATED EXPOSURE UPTAKE BIOKINETIC MODEL FOR LEAD IN CHILDREN
11-156952	14-Jul-94	MEMO REGARDING REVISED INTERIM SOIL LEAD GUIDANCE FOR CERCLA SITES AND RCRCA CORRECTIVE ACTION FACILITIES
11-207	01-May-96	Soil Screening Guidance: Technical Background Document [EPA # 540-R-95-128]
11-176382	01-Dec-96	Region 1 EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses
11-157941	01-Jun-97	ECOLOGICAL RISK ASSESSMENT GUIDANCE FOR SUPERFUND: PROCESS FOR DESIGNING AND CONDUCTING ECOLOGICAL RISK ASSESSMENTS - INTERIM FINAL
11-158350	01-Jul-97	EPA Health Effects Assessment Summary Tables FY 1997 Update
11-190104	01-Aug-97	EXPOSURE FACTORS HANDBOOK 1997
11-196795	01-Jan-98	MTBE Fact Sheet #2 Remediation of MTBE Contaminated Soil and Groundwater

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DOCNUMBER	DOCDATE	TITLE
11-160616	24-Mar-98	GUIDANCE FOR IMPLEMENTING SUPERFUND REFORM INITIATVE 9a: RISK SHARING, OSWER DIRECTIVE 9010.02
11-189662	01-Apr-98	GUIDELINES FOR ECOLOGICAL RISK ASSESSMENT
11-500009392	01-Jul-99	A GUIDE TO PREPARING SUPERFUND PROPOSED PLANS, RECORDS OF DECISION, AND OTHER REMEDY SELECTION DECISION DOCUMENTS, OSWER DIRECTIVE 9200.1-23P
11-175137	01-Dec-01	RISK ASSESSMENT GUIDANCE FOR SUPERFUND: VOLUME I HUMAN HEALTH EVALUATION MANUAL RAGS) PART D, STANDARDIZED PLANNING, REPORTING, AND REVIEW OF SUPERFUND RISK ASSESSMENTS) - FINAL
9-1174885	01-Jan-02	Region 9 Biological Technical Assistance Group (BTAG) Recommended Toxicity Reference Values for Birds and Mammals. November 21
11-190303	31-Oct-02	CHARACTERIZING RISKS POSED BY PETROLEUM CONTAMINATED SITES: IMPLEMENTATION OF THE MADEP VPH/EPH APPROACH
11-78	01-Nov-02	OSWER DRAFT GUIDANCE FOR EVALUATING THE VAPOR INTRUSION TO INDOOR AIR PATHWAY FROM GROUNDWATER AND SOILS (SUBSURFACE VAPOR INTRUSION GUIDANCE)
11-190669	01-Dec-02	CALCULATING UPPER CONFIDENCE LIMITS FOR EXPOSURE POINT CONCENTRATIONS AT HAZARDOUS WASTE SITES
11-175878	01-Dec-02	SUPPLEMENTAL GUIDANCE FOR DEVELOPING SOIL SCREENING LEVELS FOR SUPERFUND SITES - OSWER 9355.4-24
11-174559	01-Jan-03	RECOMMENDATIONS FROM THE TECHNICAL REVIEW WORKGROUP FOR LEAD FOR AN APPROACH TO ASSESSING RISKS ASSOCIATED WITH ADULT EXPOSURES TO LEAD IN SOIL EPA-540-R-03-001
11-190659	22-Aug-03	RCRA ECOLOGICAL SCREENING LEVELS
11-176288	01-Nov-03	GUIDANCE REGARDING ASSESSING INTERMITTENT OR VARIABLE EXPOSURES AT LEAD SITES, EPA 540-R-03-008, OSWER NO. 9285.7-76
11-196771	01-Nov-03	Ecological Soil Screening Levels for Aluminum. Interim Final.
11-196782	01-Nov-03	Ecological Soil Screening Levels for Iron. Interim Final.
11-136	05-Dec-03	MEMO REGARDING REVISIONS TO HUMAN HEALTH TOXICITY VALUES IN SUPERFUND RISK ASSESSMENTS
11-195	01-Jul-04	RISK ASSESSMENT GUIDANCE FOR SUPERFUND (RAGS), VOLUME 9 - HUMAN HEALTH EVALUATION MANUAL, PART E: SUPPLEMENTAL GUIDANCE FOR DERMAL RISK ASSESSMENT

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DOCNUMBER	DOCDATE	TITLE
11-196798	01-Jan-05	Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver and Zinc)
11-196772	01-Feb-05	Ecological Soil Screening Levels for Antimony. Interim Final.
11-196774	01-Feb-05	Ecological Soil Screening Levels for Barium. Interim Final.
11-196775	01-Feb-05	Ecological Soil Screening Levels for Beryllium. Interim Final.
11-196773	01-Mar-05	Ecological Soil Screening Levels for Arsenic. Interim Final.
11-196776	01-Mar-05	Ecological Soil Screening Levels for Cadmium. Interim Final.
11-196778	01-Mar-05	Ecological Soil Screening Levels for Cobalt. Interim Final.
11-196783	01-Mar-05	Ecological Soil Screening Levels for Lead. Interim Final.
11-196790	01-Apr-05	Ecological Soil Screening Levels for Vanadium. Interim Final.
11-196797	01-Nov-05	Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act (TSCA)
3-2246068	01-Jul-06	Region 3 BTAG Freshwater Screening Benchmarks
11-196789	01-Sep-06	Ecological Soil Screening Levels for Silver. Interim Final.
11-196779	01-Feb-07	Ecological Soil Screening Levels for Copper. Interim Final.
11-196785	01-Mar-07	Ecological Soil Screening Levels for Nickel. Interim Final.
11-196780	01-Apr-07	Ecological Soil Screening Levels for DDT and Metabolites. Interim Final.
11-196781	01-Apr-07	Ecological Soil Screening Levels for Dieldrin. Interim Final.
11-196784	01-Apr-07	Ecological Soil Screening Levels for Manganese. Interim Final.
11-196786	01-Apr-07	Ecological Soil Screening Levels for Pentachlorophenol. Interim Final.
11-176289	01-May-07	USER'S GUIDE FOR INTEGRATED EXPOSURE UPTAKE BIOKINETIC MODEL FOR LEAD IN CHILDREN (IEUBK), EPA 540-K-01-005, OSWER NO. 9285.7-42
11-196787	01-Jun-07	Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs). Interim Final.
11-196791	01-Jun-07	Ecological Soil Screening Levels for Zinc. Interim Final.
11-196788	01-Jul-07	Ecological Soil Screening Levels for Selenium. Interim Final.
11-196777	01-Apr-08	Ecological Soil Screening Levels for Chromium. Interim Final.
11-196792	01-Jun-08	Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment. Office of the Science Advisor
11-196796	01-Jan-09	National Recommended Water Quality Criteria

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DOCNUMBER	DOCDATE	TITLE
11-150131	26-Jun-09	Update of the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters, OSWER 9200.2-82 [Transmittal Memorandum and Concurrences Copy Included]
11-176381	30-Sep-09	Provisional Peer-Reviewed Toxicity Values for Complex Mixtures of Aliphatic and Aromatic Hydrocarbons
11-500020882	20-Sep-10	REVISED GUIDANCE ON COMPILING ADMINISTRATIVE RECORDS FOR CERCLA RESPONSE
11-190077	01-Dec-10	RECOMMENDED TOXICITY EQUIVALENCE FACTORS (TEFs) FOR HUMAN HEALTH RISK ASSESSMENTS OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN AND DIOXIN-LIKE COMPOUNDS
11-190592	01-Sep-11	EXPOSURE FACTORS HANDBOOK, 2011 EDITION
11-196770	01-Apr-12	Drinking water standards and health advisories
11-196793	01-Jan-13	Ground Water Issue Paper: Synthesis Report on State of Understanding of Chlorinated Solvent Transformation
11-190433	01-Jan-14	TECHNICAL FACT SHEET - 1,4-DIOXANE
11-196794	19-Feb-16	Light Nonaqueous Phase Liquids (LNAPL) and the MCP: Guidance for Site Assessment and Closure
11-197872	14-Nov-16	UPDATE TO 2010 REVISED GUIDANCE ON COMPILING ADMINISTRATIVE RECORDS FOR CERCLA RESPONSE ACTIONS